

EVERYMAN'S ENCYCLOPAEDIA

IN TWELVE VOLUMES
VOLUME TEN



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ABBREVIATIONS

The titles of subjects, which are printed first in bold type, have been abbreviated within each article to the initial letter or letters.

ac., acre(s).	lat., latitude.
agric., agricultural.	lb., pound(s).
ambas., ambassador(s).	l. b., left bank.
Amer., American.	long., longitude.
anot., ancient.	m., mile(s).
ann., annual.	manuf., manufacture.
arron., arrondissement.	M.E., Middle English.
A.-S., Anglo-Saxon.	min., minute(s).
A.V., Authorised Version.	Mod. E., Modern English.
b., born.	m.p.h., miles per hour.
Biog. Dic., Biographical Dictionary.	mrkt tn, market town.
bor., borough.	MS., MSS., manuscript(s).
bp., birthplace.	mt, mts, mount, mountain(s).
Brit., British.	N., north; northern.
c., about.	N.T., New Testament.
C., Contigrade.	O.E., Old English.
cap., capital.	O.F., Old French.
cent., century (7th cent.).	O.T., Old Testament.
chem., chemistry.	oz, ounce(s).
co., county.	par., parish.
com., commune.	parl., parliamentary.
cub. ft., cubic feet.	pop., population.
d., died.	prin., principal.
Dan., Danish.	prof., professor.
dept., department.	prov., province; provincial.
dimin., diminutive.	pub., published; publication.
dist., district.	R., riv., river.
div., division.	R.A.F., Royal Air Force.
E., east; eastern.	r. b., right bank.
eccles., ecclesiastical.	Rep. of Ireland, Eire.
ed., edition; edited.	R.N., Royal Navy.
educ., educated.	Rom., Roman.
e.g., example.	r.p.m., revolutions per minute.
Ency. Brit., <i>Encyclopaedia Britannica</i> .	R.V., Revised Version.
Eng., English.	S., south; southern.
estab., established; establishment.	sec., second(s).
fl., flourished.	sev., several.
Flem., Flemish.	Sp., Spanish.
fort. tn, fortified town.	sp. gr., specific gravity.
Fr., French.	sq. m., square miles.
ft, feet.	temp., temperature.
Ger., German.	ter., territory.
Gk, Greek.	tn, town.
gov., government.	trans., translated; translation.
Heb., Hebrew.	trib., tributary.
hist., history.	U.K., United Kingdom.
horticult., horticultural.	U.N., United Nations.
h.p., horse-power.	univ., university.
H.Q., headquarters.	U.N.O., United Nations Organisation.
hr(s), hour(s).	urb., urban.
in., inch(es).	U.S.A., United States of America.
inhab., (in)habitant(s).	vil., village.
is., island(s).	vol., volume.
It., Italian.	W., west; western.
Jap., Japanese.	Wm, William.
jour., journal.	yd(s), yard(s).
Lat., Latin.	

Phnom Penh, cap. of Cambodia (q.v.), situated on the R. Mekong (q.v.), where a channel connects it with Tonle Sap (q.v.), 130 m. NW. of Saigon. P. P. is the site of the royal palace of Cambodia. Rice, tobacco, salted fish, pepper, gamboge, indigo, maize, silk, cotton, tortoise-shells, and cattle are exported; boat building is carried on. Since Cambodia became an independent state, numbers of foreign embassies and aid-missions have been estab. at P. P. Pop. 200,000 (approx.).

Phocaea (modern Fokha or Fokia), anct Ionian city on the W. coast of Asia Minor. Its inhab. were noted for their maritime pursuits, and founded the colonies of Massilia (Marseilles) and Alalia in Corsica. During the 6th cent. BC it submitted to the Persian yoke, but in 500 joined in the Ionian revolt against Persia. The modern tn was founded by the Genoese in 1421.

Phocas, see BYZANTINE EMPIRE.

Phocidae, see SEAL.

Phocion (c. 402-317 BC), Athenian gen. He distinguished himself at Naxos (376), with Evagoras conquered Cyprus (351), restored the power of Athens in Euboea (349), and drove Philip out of Chersonesus (340). He showed his wisdom in advising cessation of hostility with the Macedonian king and in trying to check the Athenian policy of war. He was involved in the intrigues of Cassander, and, in particular, was suspected of having advised Alexander Aegus, son of Polysperchon, to seize the Piraeus in 318. Alexander, to whom he fled, betrayed him to the Athenians and he was compelled to drink the hemlock. There are lives by Plutarch and Cornelius Nepos.

Phocis, prov. of anct Greece, N. of the gulf of Corinth and W. of Boeotia, and traversed by the mt range of Parnassus (8068 ft.). The Delphic shrine, though within its borders, was controlled by the Amphictyonic League, in the council of which P. had 2 votes. The Phocian War (355-346 BC) ended in the conquest of P. by Philip of Macedon, who razed all its towns excepting Abae.

Phocoena, see PORPOISE.

Phoebus and **Phoebe** (Greek for bright), names of Apollo, the sun god, and Artemis, the moon goddess, respectively.

Phoenicia. Out of 2 Gk forms, *phoinix*, -*skos*, and *phoinos*, the Romans formed the Lat. names for Carthaginians, *Punici* and *Poeni*; the change from *ph* to *p* was due to Etruscan influence; the etymology of *phoinix* is uncertain, but the word is traditionally explained as 'palm-tree'; it is more probable that it meant 'red' (due to the sunrise, from the Gk point of view), 'Orient', 'Levant'. The indigenous name was *Kana'an*, Heb. *Kena'an*, Accadian *Kinabhi*, *Kinabna*; Egyptian *K'-n'-n'*. This anct country extended along the E. coast of the Mediterranean, perhaps from the Amanus Mts on the N. to Mt Carmel

on the S., and was bounded on the E. by the mts of Libanus and Anti-Libanus (i.e. Lebanon). Its N. and S. as well as its inland frontiers differed at different periods, according to the gradual progress and decline of its people; and, indeed, so uncertain would their boundaries appear to have become after the loss by the Phoenicians of their independence, that no two Gk or Rom. writers can be found to assign the same limits to their ter. The chief tns, which were for the most part built on the coast or upon is., were, from S. to N., Acco (subsequently Ptolemais and then St Jean d'Acre); Tyre and Sidon, for some period the chief of all the Phoenician cities; Sarepta (Sarpad), between Tyre and Sidon, and mentioned in the hist. of Elijah as Sarpadath (1 Kings xvii. 9); Berytus (modern Beirut), a few m. N. of Sidon (later the Rom. colony Felix Julia); Byblos (Heb. Gebel, Phoenician Gubl, modern Jubel or Djebail), 24 m. N. of Berytus, the seat of the governor of P. in the Tel el-Amarna period and of the worship of the goddess Baaltis; Tripolis (now Tarābulus), so named because it originally consisted of 3 cities, each a furlong distant from the next, and each with its own ramparts; and Arvad or Aradus (modern Ruād) on an is. N. of P., and whose fleet is mentioned in the Tel el-Amarna tablets. Ugarit (modern Ras Shamrah), situated opposite the most easterly cape of Cyprus (some 6 m. N. of Latakia), was a flourishing city in the second half of the 2nd millennium BC. The soil produces at the present day a great variety of timber, cereal, and other crops; the mineral ores are confined to iron and stone. It is difficult to say for which of the 2 occupations, mining or navigation, this industrious and energetic people was more renowned. The rough, rocky soil did not tempt the Phoenicians to become farmers, but the great blue waters before them, and the splendid cedar forests which covered their mts made them, as far as we now know, the first navigators who ever sailed out of sight of land. To obtain metals for their craftsmen they ventured into every part of the Mediterranean and apparently even out into the Atlantic Ocean to Gaul and Britain. They brought gold and silver from Spain (perhaps also gold from Ireland), copper from Cyprus, and probably iron and tin from Britain. They brought pearls from the E., perfumes and spices from Arabia, fine linen from Egypt, lions' and panthers' skins from Africa. They made useful articles of this material, and sold them in all parts of the anct world. The most famous of their recorded

not usually penetrate far inland, but on the coast-line the names of Phoenician

trading posts are found in various parts of the Mediterranean, even in Greece and Egypt. The strongest settlements of the Phoenicians were always on the is. Cyprus was especially favoured by them.

Traces of Phoenician influence appear in Gk art and religion; but by far the most important Phoenician contribution to Gk culture was the transmission of the alphabet (q.v.). P. has also been said, upon no cogent evidence, to have been the original home of glass-making. The Tyrian purple, obtained at great cost from shellfish, a sort of Phoenician whelk, known as a *murex* (each yielding but a drop of dye), was famous all over the world.

The Phoenicians belonged to the NW. branch of the Semites (q.v.). It is probable that they settled on the coast of Syria during the 4th millennium, though they do not appear in history before the 18th cent. bc.

History. Apart from the evidence from cuneiform and Phoenician inscriptions, the sources of Phoenician hist. are confined to the Bible and to Gk historians such as Herodotus, Menander of Ephesus, Josephus's fragments of the Phoenician Deus's hist. of Tyre, Justin, and a few others. The extraordinary discoveries (1933-8) of the Fr. scholar André Parrot at Tell Hariri (anc. Mari) on the Middle Euphrates of the royal archives (containing over 20,000 tablets written in cuneiform script) show that the Amorite kingdom of Mari of the 18th cent. bc had diplomatic and commercial relations both with Mesopotamia and the cities situated on the Mediterranean coast. Among the numerous states and tns mentioned in the Mari tablets we find the important Phoenician city-state of Byblos. Excavations in P. show that in the 18th cent. bc (and probably even earlier) this country was under Egyptian control. Even in the far N., at Ras Shamrah (anc. Ugarit), and in the far E. at Qatna (NE. of Hama), there have been found monuments proving direct connections between P. and the Egyptian kings. The archaeological finds at Byblos give a vivid idea of the extent to which the art and craftsmanship of P. were influenced by Egypt in the 19th and 18th cents. bc. After the Hyksos invasion of Egypt, which overthrew the twelfth dynasty (middle of the 18th cent. bc), P. became independent, and her cities were free to develop economic and military strength without outside interference. With the eighteenth dynasty (c. 1570 onwards), however, and particularly with Thothmes III (first half of the 15th cent.), P. became an Egyptian prov. The glory of P. only truly began with the recovery of its independence on the decay of the Egyptian empire in the 14th cent. bc. At that period Byblos was the first city of P., and as it was the chief centre of trade in papyrus, the Greeks took the word *bublos* for 'papyrus' and 'book' (hence many centuries later, the name *la biblia* 'the Bible'). Later Sidon and Tyre achieved the hegemony of P. From the 11th or 10th cent. on-

wards P. estab. colonies throughout the Mediterranean coasts. At the end of the 2nd millennium bc, with the definite or temporary political decay of the great nations of the Bronze Age, the Egyptians, the Babylonians, the Assyrians, the Hittites, the Cretans, in the E. Mediterranean, we enter a new historical world. P. (as well as 2 other Semitic nations, Israel and Aram) played an increasingly important part. To the W. of P. seeds were sown among the eager-minded peoples which later constituted the Gk nation. A vast Phoenician colonial empire was built up in the E., S., and W. Mediterranean, in Cyprus, N. Africa, Malta, Sicily, Sardinia, Marseilles, and Spain. Trading colonies were estab. in Greece, Egypt, and other countries. In the 10th cent. bc Tyre, under Hiram I, son of Abibal, and contemporary of David and Solomon, became the leading Phoenician state. Solomon requested the aid of Sidonian artificers and a supply of cedar wood from Lebanon for the construction of the temple and royal buildings; and if, as tradition says, Phoenician workmen built the whole temple, its brazen pillars and Holy Place were sufficient testimony of their skill in applied art. The golden age of P. waned when Hiram's third successor, Ithobaal, having murdered the last of the sons of Hiram, seized the throne and assumed the style of 'King of the Sidonians'. In 876 bc Awad, Byblos, Tyre, and Sidon were under Assyrian domination, and paid tribute to the Assyrian king, Assurnazirpal. Under Hiram II Tyre was trib. to Tiglath-pileser III of Assyria; but the next Tyrian and Sidonian king, Luli or Elulaeus, revolted and successfully withstood a siege by Shalmaneser V. During Sennacherib's campaign against Hezekiah (701 bc) Luli fled to Cyprus, though Tyre still held out. Arvad and Gebal (or Byblos), however, surrendered to the Assyrians. At this time Sidon was under the rule of an Assyrian nominee, Ithobaal; under his successor, 'Abdmilkut, he rebelled against Assarhaddon in 678 bc, was destroyed, and then rebuilt. Tyre, after the destruction of Sidon, assumed the hegemony of so much of P. as was left independent, but was besieged at various times, and finally in 588 bc by Nebuchadnezzar. Its king surrendered, and a puppet king (Baal II) was appointed, who reigned from 574 to 564 bc. Afterwards the monarchy of P. gave way for a time to a system of gov. by *suffetes*, or judges. With the fall of Babylonia (539 bc) P. passed under Persian rule, and (together with Cyprus and Syria) she became the fifth Persian satrapy; but the Phoenician cities continued to have their kings and local autonomy. Phoenician fleets were frequently employed by the Persians in naval warfare, as in the attack on Miletus during the Ionian revolt, 498 bc, and again, in 480 bc, the most reliable portion of the Persians' naval forces was composed of Phoenician ships and crews. But at the battle of Eurymedon, when Persian naval power was completely broken, Cimon of

Athens intercepted 80 Phoenician galleys and destroyed most of them off the coast of Cyprus (467 BC). A Phoenician navy was also engaged in the closing stages of the Peloponnesian war. P. was eventually merged into the empire of Alexander the Great. From 197 it belonged to the Seleucidae until it was included in the Rom. prov. of Syria (64 BC).

The chief, if not the only, reliable sources of our information concerning the religion, manners, and laws of the Phoenicians, are the Phoenician inscriptions (see below) and coins. The latter may be divided into 3 groups: (1) the earliest period, i.e. from the beginning of the Phoenician coinage (end of the 5th cent. BC) until Alexander the Great; (2) the period of Alexander, the Ptolemies, and the Seleucids; (3) the period of the Rom. Empire.

Language. The Phoenician language, now extinct, belongs (together with Hebrew, Moabite, Ammonite, Edomite, all strictly related to each other, and perhaps also the language of the numerous Ugarit or Ras Shamrah inscriptions) to the Canaanite main branch of the NW. subdiv. of the Semitic linguistic family. Phoenician was the speech current in pre-Christian times in the commercial cities of the Phoenician coast, Tyre, Sidon, Byblos, and the neighbouring ones, where it was spoken for over 1500 years. It was also the language of the numerous Phoenician colonies along the Mediterranean shores, and particularly at Carthage and its colonies—the Carthaginian dialect is known as Punic. Phoenician inscriptions have also been found in the is. of Cyprus, in Greece, in Malta, Sicily, Sardinia, Marseilles, Avignon, and Spain. Two extremely important Phoenician inscriptions (including a Phoenician Hittite bilingual) were recently discovered at Karatepe (q.v.) in E. Cilicia. In the W. Mediterranean, especially in the ter. of Carthage, the Punic dialect outlived the fall of this metropolis as well as the Phoenician language of the mother country. In the 5th and 6th cents. AD it was still the language of the peasants, and probably continued to be so until the Arabic conquest. It may thus be said that Phoenician was spoken for about 2000–2250 years, or even longer.

Z. S. Harris, the author of 2 outstanding books on Phoenician (*A Grammar of the Phoenician Language*, 1936, and *Development of the Canaanite Dialects, an Investigation in Linguistic History*, 1939), subdivides the Phoenician language as follows: (1) Early Phoenician, down to the end of the 9th cent. BC; (2) Middle Phoenician, 8th to 6th cents. BC, inclusive; (3) Late Phoenician (in P. itself), 5th cent. BC to the beginning of the Christian era; (4) Punic, c. 5th cent. BC to 146 BC (i.e. to the destruction of Carthage); and (5) Neo-Punic, 146 BC to the 6th cent. AD or to the Arabic conquest. The Phoenician inscriptions (including the Punic and Neo-Punic inscriptions) are our main source for the study of the Phoenician language. Comparatively few

inscriptions have been found in P. itself; but the earliest of them, including the Hiram epitaph, belonging to the last centuries of the 2nd millennium BC or the 1st cent. of the 1st millennium BC, are the earliest extant readable inscriptions, written in the N.-Semitic alphabet, the prototype of all existing or discontinued alphabets (see under ALPHABET). The next few centuries have been rather poor in their yield; the bulk of material from P. proper is late and consists largely of royal *stelae*, belonging to the 4th–2nd cents. BC. By far the largest number of Phoenician inscriptions are Punic, of which thousands have been unearthed at Carthage; nearly all of them, however, are of a votive or funerary character. The main differences between the Phoenician and the 'Punic' inscriptions are the following: (1) The latter became more and more cursive; these differences, with a few exceptions, were purely external: the number and the phonetic value of the letters remained always the same: the direction of the lines, always horizontal, was constantly from right to left. (2) The Punic inscriptions linguistically betray the mixed pop. of the empire of Carthage, which may be termed 'Berber-Phoenician' or 'Libyo-Phoenician'.

Another source for the study of the Phoenician language is contained in the transcriptions of Phoenician words into the scripts of other languages, such as Egyptian, Assyrian, Hebrew (in the Bible), and particularly in the classical literature or Gk and Lat. inscriptions. These transcriptions are very important because they give, if only in a limited way, a picture of the vocalisation of Phoenician, whilst the Phoenician and Punic inscriptions are purely consonantal. The only example of connected Phoenician discourse in transcription appears in Plautus's *Poenulus* (v. 1 and 11), which contains a monologue of 10 lines in Punic—with Lat. paraphrase—of a Carthaginian of Plautus's times (late 3rd cent. BC).

Religion. Like all anct Semitic religions, except that of the Hebrews, the Phoenician religion was a pantheistic and personified worship of the forces of nature. Until recently one of the main sources for the study of Phoenician mythology was the work of Philo of Byblos, a Phoenicio-Gk historian, who apparently was born c. AD 42, and still lived in 117. His work was supposed to be based on the works written by Sanchuniathon, a Phoenician priest born in Berytus, c. 11th cent. BC. Unfortunately Philo's work has only been preserved in fragments quoted by late Gk historians. Our historical sources of the Phoenician religion are thus very meagre and indirect; but they have been supplemented by recent discoveries at Ras Shamrah (see above). At that site, in 1929 and the following years, hundreds of clay-tablets, dating from the 15th and early 14th cents. BC, were found (written in a hitherto unknown cuneiform alphabet of 32 letters; see under ALPHABET), which proved to be documents of inestimable value in many fields of research, but

particularly in hist. of religion. Many of these documents were found in a library housed in a building situated between the city's two great temples, one dedicated to Baal and the other to the god Dagon. The majority of the documents are in the nature of mythological poems concerning early Phoenician gods and heroes. The supreme god is known as El (= 'God' in the Heb. Bible). The wife of El is Asherah-of-the-Sea, the counsellor of the gods, and their son is Ba'al, who is the god of the rain and storm. Amongst the adventures related of Ba'al is a conflict with Lotan (= probably the Heb. Leviathan). Aliyan Ba'al represents the growth of plants, and fights against Moth (= 'Death'), the god of the dried-up summer soil, but is slain by him. The goddess Anath, the sister and lover of Aliyan, goes in search of him, recovers his body, brings him back to life, slays his enemy, Moth, and places Aliyan on Moth's throne to assure the revival of vegetation in another season.

The later Phoenician religion is known, but very imperfectly indeed, from the various inscriptions (see above). Every city and high place had its local Baal, and there were, as well, Baalim of the mts and rvs. By the side of Baal stood his female counterpart, Baalath. But the female element in nature was usually adored under the name of Ashtoreth or Ashtart. Among the other main gods must be included Melkarth (king of the city), the supreme 'Baal of Tyre.' There can be no doubt that Phoenician idolatry, human sacrifices, and 'prostitution practised in the name of Ashtoreth' recall the worst features of pagan worship. Later, at Carthage and Marseilles, a ram was substituted for the human sacrifice and a meat-offering prescribed.

See H. R. Hall, *Ancient History of the Near East*, 1913; E. Kéble Chatterton, *The Romance of the Sea Rovers*, 1924; G. Contenau, *La Civilisation phénicienne*, 1926; A. R. Burn, *Minoans, Philistines, and Greeks*, 1930; Z. S. Harris, *A Grammar of the Phoenician Language*, 1936.

Phoenicopteridae, see FLAMINGO.

Phoenix, son of Amyntor and Hippodamia. He quarrelled with his father, having seduced the latter's mistress, Cleobule, was banished, and fled to Peleus. Peleus made him tutor to his son, Achilles, whom he accompanied to Troy (*Iliad*, ix).

Phoenix, cap. of Arizona, U.S.A., co. seat of Maricopa co., on the Salt R., 100 m. NE. of Tucson. The chief industries are agriculture, the processing of dairy products, and the export of citrus fruit. Manufacts. include steel, aluminium, and wood products, rock wool, aircraft equipment, air-conditioning units, leather goods, and Indian novelties. Parks and Indian reservations are points of interest. The city has an airport, U.S. Indian school, and the Amer. Inst. for Foreign Trade. Pop. 106,800.

Phoenix, fabulous sacred bird of Egypt, which according to the people of Heliopolis visited them once every 500 years

on the death of its father. The story, as told by Herodotus, who did not believe it, was that the P. came from the Arabian desert, bearing its father embalmed in a ball of myrrh, and buried him in the temple of the sun. It was said to resemble an eagle in size and shape, but had red and gold plumage. According to another story, the bird placed itself on the burning altar at Heliopolis, and from the ashes there flew a young P., freshly feathered. Pliny's version is that it built for itself a nest in which to die, and that a new bird sprang from the corpse. There was never more than one P. at a time.

Phoenix Group, 8 small is. in the W. Pacific Ocean, between 2° 30' and 4° 30' S. lat., and 171° and 174° 30' W. long. They have formed part of the Gilbert and Ellice (q.v.) Is. Colony since 1937. Enderbury and Canton Is. are under joint Anglo-Amer. administration. Canton is an international airport. Area 16 sq. m.; pop. 990.

Phoenixville, bor. of Chester co., Pennsylvania, U.S.A., 21 m. NW. of Philadelphia. It has ironworks, meat packing, and manufacturing industries. Pop. 13,000.

Pholls, see CENTRONOTUS.

Phonetics, the branch of linguistic science that deals with spoken language. ARTICULATORY PHONETICS investigates and analyses the movements of the organs of speech used in producing the sounds and sequences of sounds occurring in spoken utterance. Elementary phonetic theory classifies the basic movements, or articulations, according to the state and direction of the air stream, and the degree of stricture of the air passage. On this basis, categories are established which include plosives, affricates, nasals, laterals, rolls (trills), fricatives, frictionless continuants, and vowels. These are further subdivided according to the parts of the vocal apparatus involved in the articulation: active articulators are the lips, blade, etc.), and the vocal cords; passive articulators include the upper front teeth and various defined parts of the roof of the mouth (e.g. hard palate, soft palate). The soft palate also functions as an active articulator against the back wall of the throat or pharynx. Considerations as to which active and which passive articulators are involved lead to the establishment of another set of categories of articulation which include bilabial, labiodental, dental, alveolar, palatal, velar, uvular, and glottal. Any given consonant articulation may be broadly defined in terms of the two foregoing categories, by selecting an appropriate label one from each category. Vowels are classified according to the positions the tongue can occupy without at any point constricting the air passage so much as to produce a (fricative) consonant. These positions are defined by stating which part of the body of the tongue (front, central, back) is raised, and how much.

A system of notation is essential for handling the above; the best and most widely known is the International Phonetic

Alphabet (I.P.A.). This is based on the ordinary roman letters, supplemented by modified forms of these, and by letters imported from other alphabets, as well as by some invented letter shapes, designed so as to harmonise as far as possible with the others. (There are also a number of 'modifiers' in the form of accents and other diacritics.) Each symbol is allotted in principle to a certain type of articulation, within fairly narrow limits, and stands for it by convention. A sequence of phonetic symbols (i.e. a word or sentence in phonetic transcription) then depends on a number of other conventions for its proper interpretation, covering any necessary details of the articulations, and the manner in which the transitions or glides from one position to another are effected. In this, as in many respects, the speech habits of one language differ from those of another (as do those of different individuals speaking the same language). Moreover, every articulation is itself affected by the phonetic environment in which it occurs—in other words, by the nature of neighbouring articulations in the sequence (see below). From the large number of phonetic symbols provided by the I.P.A. the transcriber selects according to his needs, which will vary with the language to be transcribed, and may also depend on the purpose the transcription is to serve. As stated above, with any sequence of written symbols there are bound to be conventions conveying some of the information. But a transcriber can choose, up to a point, what information to convey by conventions, in the form of rules, notes, description, and so forth, and what information shall be carried by the text itself. The more that is implicit in conventions, the less that needs to be explicit in the text. Conversely, however, there are practical limits to the amount of information that can be carried by the text. These and similar matters are handled in the *theory of phonetic transcription* (see specimen Eng. texts below).

A normal speech-situation presupposes a receiver as well as a transmitter of the message. While articulatory P. handles the transmitting end, ACOUSTIC PHONETICS handles the receiving end. Auditory acoustic analysis is constantly at work, not only on the part of the receiver, interpreting the message, but also on the part of the speaker himself, checking by ear and controlling his own performance as he speaks. Although, for purposes of classification, articulatory criteria are in general the most useful, in practice the movements or articulations themselves are closely linked with the sounds resulting from them, to produce which is their sole aim and object, so that the movements can hardly be studied in isolation, i.e. without taking the resultant sounds into account.

One of the fundamental requirements for practical phonetic work is systematic *ear training*—the cultivation of a keen and analytical ear for distinctions of

sound; the basic technique consists of graded dictation of meaningless material, generally known as *nonsense words*. This compels the transcriber to direct his attention to features of sound, irrespective of whether they happen to be familiar to him from his own language or not. Naturally, for this type of work an agreed system of notation is essential.

Various kinds of apparatus are used in the branch of P. termed INSTRUMENTAL PHONETICS (also known as experimental P.). Sometimes articulatory processes are investigated instrumentally; but much instrumental work falls under the heading of acoustic P. With the help of apparatus very accurate analyses can be made of the complex sounds that reach our ears. Acoustic analysis establishes the fact that sounds in nature very rarely consist of what are called 'simple tones,' but are each composed of a combination or series of tones which we are as a rule unable to perceive separately but which affect our estimation of 'quality,' e.g. the character of different musical instruments, of different voices, of different vowels, and so on. Because the ear is capable of differentiating qualities of sound, it is believed that it must act in some way like a harmonic analyser. (There is still considerable doubt as to the nature of the hearing process.) But it is only by instrumental techniques that the component parts of a complex sound can be revealed and measured, and in this respect apparatus can convey more information about sounds than can the ear. In other respects, some instruments are more sensitive than the human ear, others less sensitive, and for instrumental evidence to be useful in linguistic work, it is most important that it should be correlated with perceptual evidence, in other words, it is essential to establish just what instrumental evidence is in fact audible and what is, for instance, too quiet, or too rapid, to be perceived by human hearing.

Native speakers of a language feel some distinctions of sound (resulting from appropriate differences in the articulatory processes) to be important, other distinctions to be quite unimportant or irrelevant—though they may be quite perceptible, especially to the trained ear. It is generally found that the 'important' distinctions are those that are capable of making the difference between separate words that actually exist in that language, all other distinctions being felt to be irrelevant. For instance, in English *p* and *b* are found to distinguish words such as *pat* and *bat*; *t* and *d* are found to distinguish *pat* and *pad*; the sounds represented by the letters *a* and *e* are found to distinguish *pat* and *pet*, and so on. Such sounds are termed the *phonemes* of the language, and one of the main purposes of STRUCTURAL PHONETICS is to establish the inventory of phonemes of a language, and study the orders and groupings in which they can occur. (Structural P. is also concerned with the syllable, the functioning of the vowels and consonants in relation to the syllable, the

types of syllable occurring in a language, and a variety of other phenomena covering longer stretches of speech, including the prosodic features of length, stress, and intonation.) It is also necessary to examine the differences between the numerous *allophones* of a given phoneme. A phoneme is a class of sounds; all the allophones of a phoneme constitute the members of the class. The allophones are the realisations in actual speech of the phonemes, each allophone being conditioned and determined by the context (or phonetic environment) in which it occurs. Looked at in another way, what we actually pronounce, and hear, are allophones; but we are conditioned to recognise these in terms of the phonemes they represent. For example, the 't-sounds' which we identify in the Eng. words *lack*, *stack*, *track*, *button*, *eight* are all sounds (or rather allophones) belonging to the Eng. *t* phoneme. It is quite possible to describe in phonetic terms the differences between each of these allophones, in the speech of one person. But the ordinary native Eng. speaker feels such distinctions to be unimportant, even when his attention is drawn to them. Speakers of some other language may feel otherwise, due to the different distinctions that are felt to be important in their language. Expressed in phonetic terminology, distinctions that are allophonic in one language may be phonemic in another.

A phonetic transcription that sets out the sequences of phonemes is a *phonemic transcription*; a transcription that records differently from each other any of the allophones of a given phoneme is to a greater or lesser extent an *allophonic* one. Two specimen transcriptions follow, both representing an identical pronunciation of sentences taken from the second paragraph of this article, but differing typographically in numerous respects. *Transcription A* uses the simplest possible letters to record the sequences of Eng. phonemes, and nothing else besides a mark of stress.

e 'sɪstɪm ev nou'teɪn ɪz ɪ'senʃl fe
'hændlɪŋ ðɪ eɪv; ðe 'best en moʊst
'waɪdlɪ 'naʊn ɪz ðɪ ɪntə'neɪʃnl fe'netɪk
'ælfəbɪt. 'ðɪs ɪz 'beɪst ɒn ðɪ 'oʊdnrɪ
'roumən 'leɪz, 'sæplɪmentɪd baɪ
'mɒdɪfaɪd 'foʊmz ev ði:z, end baɪ
'leɪz ɪm'pʊtɪd frəm 'ʌðər ælfəbɪts, ez
'wel ez baɪ sɑm ɪn'ventɪd leɪz feɪps,
dɪ'zaɪnd sɒv ez te 'hɑ:menəɪz ez 'fɑ:ɪ
ez 'pɒsəbl wɪð ðɪ 'ʌðəz.

TRANSCRIPTION 'A'

Transcription B employs more precise, 'comparative' symbols for the vowels, and for *r*. It is also allophonic in a

number of ways: syllabic consonants are distinguished from non-syllabic, e.g. final *ŋ* in *notation* is syllabic; two varieties of *l* are shown; aspirated allophones of *t* and *p* are marked; unvoiced allophones of *v*, *z*, and *d* are shown; and variations in the length of vowels. In addition, the intonation of a possible reading of the passage is indicated by a system of diacritics known as tonetic stress marks.

e 'sɪstɪm ev nou'teɪn ɪz ɪ'senʃl fe
'hændlɪŋ ðɪ eɪv; ðe 'best en moʊst
'waɪdlɪ, no: ɒnɪz ðɪ ɪntə'neɪʃnl fe'netɪk
'ælfəbɪt. 'ðɪs ɪz 'beɪst ɒn ðɪ 'oʊdnrɪ
'roumən 'leɪz, 'sæplɪmentɪd baɪ
'mɒdɪfaɪd 'fo: mɪz ev ði:z, end baɪ
'leɪz ɪm'pʊtɪd frəm 'ʌðər ælfəbɪts, ez
'wel ez baɪ sɑm ɪn'ventɪd leɪz feɪps,
dɪ'zaɪnd sɒv ez te 'hɑ:menəɪz ez 'fɑ:ɪ
ez 'pɒsəbl wɪð ðɪ 'ʌðəz.

TRANSCRIPTION 'B'

See L. E. Armstrong and Ida C. Ward, *English Intonation*, 1931; P. MacCarthy, *English Pronouncing Vocabulary*, 1945, *English Pronunciation*, 1956, and *English Conversation Reader*, 1956; D. Jones, *The Pronunciation of English* (3rd ed.), 1950, *Outline of English Phonetics* (8th ed.), 1956, and *English Pronouncing Dictionary* (11th ed.), 1957; Ida C. Ward, *The Phonetics of English* (4th ed.), 1956; R. Kingdon, *The Groundwork of English Intonation*, 1958; also *The Principles of the International Phonetic Association* (obtainable from the Dept of Phonetics, Univ. College, London).

Phonograph, see GRAMOPHONE.

Phonography, see SHORTHAND.

Phormion, commander of the Athenian fleet during the 5th cent. BC. He gained, among other victories, 2 at Naupactus over the Peloponnesian fleet in 429 BC.

Phoridium, genus of hardy herbaceous plants, see FLAX; NEW ZEALAND.

Phoronis, sole genus of the class Phoronida, consisting of a few species of marine worm-like animals, which may live on rocks or in shells of Molluscs. They are widely distributed at depths varying from low water to about 30 fathoms. Each animal is encased in a tough flexible tube into which it may completely withdraw. At the anterior end is a horse-shoe-shaped group of tentacles. The fertilised eggs affix themselves to the tentacles and there develop into larvae of the actinotrocha form. P. has affinities with the Polyzoa and Sipunculoidae.

Phosgene, or Carbonyl Chloride, chloride of carbonic acid. When a mixture of equal volumes of carbon monoxide and chlorine is exposed to bright sunlight or passed over heated animal charcoal, direct combination occurs with the formation of P. or C. C., COCl₂ (Greek *phos*, light, and *genab*, I produce). This compound, discovered by John Davy in 1811, is a

Phosphates

colourless heavy gas, nearly 3.5 times as heavy as air, with a penetrating and suffocating odour which impairs the sense of taste, and is very poisonous, far more so than carbon monoxide. It is readily liquefied by cooling, forming a colourless, mobile liquid, boiling point 8.2° . The gas does not burn in moist air, but is readily hydrolysed by water. Hot water decomposes it quickly to carbon dioxide and hydrochloric acid, $\text{COCl}_2 + \text{H}_2\text{O} = \text{CO}_2 + 2\text{HCl}$. When the gas is passed into a solution of ammonia in toluene, urea is formed. P. has been used in chemical warfare (q.v.). A practical application of the gas in industry is made in the preparation of certain dyes, e.g. crystal violet.

Phosphates, salts of *ortho*-phosphoric acid, H_3PO_4 . By the action of sodium hydroxide on this acid in calculated quantities, the following P. can be obtained. NaH_2PO_4 : Sodium dihydrogen phosphate. Acid to litmus. Na_2HPO_4 : Disodium hydrogen phosphate, or ordinary sodium phosphate. Slightly alkaline; used as a reagent, and in the preparation of artificial drinking-waters. Na_3PO_4 : Normal sodium phosphate—alkaline; used as a water softener. Microcosmic salt is $\text{NaNH}_4\text{HPO}_4 \cdot 4\text{H}_2\text{O}$. All the above are soluble P. Silver phosphate, Ag_3PO_4 , is insoluble.

There are also pyrophosphates and *meta*-phosphates, salts of pyrophosphoric acid and *meta*-phosphoric acid respectively. They are of less importance than the ordinary (or *ortho*-) P.

Tests. Soluble P. give precipitates with ferric chloride (yellow-white); with silver nitrate (yellow); with warm ammonium molybdate (yellow). See MINERAL PHOSPHATES.

Phosphor Bronze, copper-tin alloy to which phosphorus has been added and capable of being made tough and malleable. In one type 0.02–0.1 per cent of phosphorus has been added for the purpose of deoxidation, and in which, on analysis, practically none will be found; in the second type 0.2–0.4 per cent of phosphorus is added, thereby increasing the toughness of the alloy. It is used chiefly for springs and for bearings: for springs the alloys contain 4.8 per cent of tin, and for bearings 9.11 per cent.

Phosphor Copper is formed by plunging a stick of yellow phosphorus, contained in a copper sheath, under the surface of molten copper. The phosphorus boils, passes through the molten copper, and is absorbed, forming a compound Cu_3P . There are two P. Cs used commercially, containing 10 per cent and 15 per cent respectively of phosphorus. It is used for making phosphor bronze.

Phosphorescence, term first applied to describe the state of luminescence which certain substances show in the dark after exposure to light. Such bodies were called 'phosphori,' and the term was afterwards applied to animals similarly endowed. Almost all bodies are phosphorescent in some degree. When the P. is continuous (as in fluorspar, quinine,

Phosphorus

etc.) it is called fluorescence (q.v.). In minerals P. may be shown by: (1) heating to a temp. below red heat (fluorspar); (2) friction (phosphorus and fused calcium chloride); (3) cleavage (mica, the two split portions exhibiting positive and negative electricity); (4) crystallisation (boracic acid after fusion).

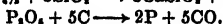
In the organic world we find numerous cases of P. The luminosity of decaying matter was at one time adduced as the cause of the P. of the sea. Now it is regarded as due to the presence of luminous bacilli. In the vegetable kingdom the cases of P. are limited to algae and fungi, the chief of the latter being hymenomycetes. A species of *tropaeolum* (*maius*) was discovered to be luminous by the daughter of Linnaeus (1762). All the groups in the animal world up to and including fishes afford examples of the phenomenon. Among the protozoa the luminous noctiluca, which is found around the coasts, emits light from the general protoplasm of the body. On the high seas it is replaced by a species of pyrocystes. The larvae of *roniera* are recorded as luminous porifera. Numerous instances of P. occur among the coelenterata. Jellyfish (*Medusae*) are luminous, also the seapens (*Pennatulidae*) and the alcyonarians and siphonophores. The ovid jelly 'Berge' emits its light only after remaining for some time in the dark. Echinoderms show a few species of opiliuroids. Worms show a large number of luminous types. The luminosity of the worm photodrilus ceases after sexual congress. Among mollusca the bivalve pholas is recorded by Pliny as being phosphorescent, emitting light from the mantle cavity. Of the Crustacea the schizopoda are self-luminous, while in others, such as the genera *Talitrus* or *Orchestia*, luminosity is probably due to the presence of luminous bacilli. The angler fish may be cited as an instance of luminous fish. Among insects are the luminous hemiptera (bugs) and coleoptera (beetles). To the former belong the lantern flies, while the luminous beetles belong to the families of the Lampyridae or Elateridae. In some species both sexes are luminous, in others only one. The colour of the light varies, but in all cases the light is monochromatic. The uses of the light are to enable sexes to find one another (earthworms); to serve as a warning signal (stinging coelenterata); to attract prey (angler fish); to illuminate the surroundings (deep-sea fish). See also BACTERIA; IGNIS FATUUS; NOCTILUCA.

Phosphoric Acid, see under PHOSPHORUS.

Phosphorus, see LUCIFER.

Phosphorus. Symbol P; atomic number 15; atomic weight 31.02. Discovered by Brand, 1674. An element which exists in two allotropic forms, viz. (1) ordinary or white P., and (2) red P. It does not occur in nature in the free state, but usually in the form of phosphates, the most important of these phosphates being the 2 salts of calcium, phosphite, $\text{Ca}_2(\text{PO}_3)_2$, and apatite, $\text{Ca}_5(\text{PO}_4)_3\text{F}$.

Calcium phosphate is present in all fertile soils and is a source of phosphate for plants; it also forms the mineral part of bones (60 per cent), and various compounds of P. are found in the animal body, such as the brain and nerves. The free element was formerly prepared from calcium phosphate, either the natural mineral or bone ash prepared by calcining bones being employed. This, treated with sulphuric acid, is converted into calcium sulphate and phosphoric acid— $\text{Ca}_3(\text{PO}_4)_2 + 3\text{H}_2\text{SO}_4 = 3\text{CaSO}_4 + 2\text{H}_3\text{PO}_4$. The insoluble sulphate is filtered off and the phosphoric acid is evaporated down, mixed with charcoal, the mixture dried in cast-iron pots, and finally distilled in clay retorts. The crude P. which distils over is condensed under water, remelted, and purified by oxidising impurities with sodium dichromate and sulphuric acid, or by pressing through chamolite leather, and is then cast into sticks. At the present time P. is obtained by heating crushed rock phosphate (calcium phosphate, large deposits of which occur in Florida, Tennessee, and N. Africa) with sand and powdered coke or anthracite in an electric furnace at 1400–1500° C. P. vapour distils off:



The calcium silicate, CaSiO_3 , forms a fusible slag which is run off, and the P. vapour is condensed under water. The crude P. is purified as above. The P. obtained in this way is the substance known as white P., and is a waxy, transparent substance, which becomes yellow or reddish from the action of light. It has a sp. gr. of 1.83, melts at 44° C., boils at 287° C. On account of its ready inflammability white P. is always kept under water, in which it is practically insoluble. It is, however, soluble in carbon disulphide, forming a solution which on evaporation leaves so fine a residue of P. that it at once takes fire in the air. On exposure to moist air, white P. glows and gives off garlic fumes and finally ignites. P. burns in air, with a brilliant white light, forming the oxide P_2O_5 ; burned with a limited supply of air the oxide P_2O_3 is mainly formed. Plunged into chlorine P. takes fire, the pentachloride, and trichloride being formed according as the chlorine is or is not in excess. Heated with caustic soda, phosphine, PH_3 , is produced. Red P. will not do this. White P. is very poisonous, and in large doses causes death in a few hours. Inhalation of the vapours of P. sets up caries of the teeth and jaw, causing what is known as 'phossy jaw.' Red P. is formed when ordinary P. is heated for some time to 250° C. in an atmosphere free from oxygen. It is purified by boiling with caustic soda, and is obtained as a red powder made up of small crystals, though for a long time thought amorphous. It has a sp. gr. of 2.05–2.34, does not take fire on exposure to air or chlorine, is insoluble in carbon disulphide and in caustic soda, and is not poisonous. The oxides of P. are P. trioxide, P_2O_3 ; P. tetroxide,

P_2O_5 ; and the pentoxide, P_2O_{10} . The first and last are the best known and give rise to phosphorous acid and phosphoric acid respectively. Phosphorous acid is formed when P. trioxide is dissolved in water, but is prepared by the action of water on the trichloride, $\text{PCl}_3 + 3\text{H}_2\text{O} = 3\text{HCl} + \text{H}_3\text{PO}_3$. The acid can be concentrated and obtained crystalline, forming crystals which melt at 70.1° C. It is a dibasic acid and is a powerful reducing agent, and on heating is converted into ortho-phosphoric acid with evolution of phosphine. When P. pentoxide is allowed to deliquesce in air it takes up one molecule of water to form meta-phosphoric acid, HPO_3 . Dissolved in hot water it reacts with 3 molecules of water, forming ortho-phosphoric acid, H_3PO_4 . Ortho-phosphoric acid, or phosphoric acid, as it is called, is commercially obtained by treating bone ash with sulphuric acid. When pure it forms crystals which melt at 38.6° C. It is a tribasic acid forming 3 series of salts. On heating above 160° C. it loses water, forming pyrophosphoric acid as a first product, and finally is converted at red heat into meta-phosphoric acid. Pyrophosphoric acid, $\text{H}_2\text{P}_2\text{O}_7$, is a glassy mass and passes into the ortho-acid when its solution is boiled. Phosphorus trisulphide is used for making matches. Safety matches contain no P., but are rubbed on a prepared surface of 'red' P. and antimony sulphide. P. is also used for making phosphor bronze. The compounds are used in sev. ways. The pentoxide is used as a desiccating agent and the phosphide of calcium is used on 'Holmes' signal, which is placed on the water, when spontaneously inflammable impure phosphine is produced. P. compounds, especially hexaethyl tetraphosphate, have proved highly effective in rendering plants, by which they are absorbed, toxic to biting and sucking insect pests.

Photius (c. 820–91), patriarch in whose time there first occurred the dispute concerning the *Filioque* (q.v.) that still helps to divide the E. from the W. Church. After holding high office in the Byzantine court he was in 858 elected patriarch in place of Ignatius, deposed for rebuking the vices of the Emperor Michael. Pope Nicholas I, however, supported Ignatius and refused to recognise P., who in return deleted the Pope's name from the canon of the Mass, a rupture of communion. A dispute over Lat. missionaries in Bulgaria made things worse. In 867 P. convened a council at Constantinople to which the papal legates were not admitted, and denounced Lat. errors, including the *Filioque* addition to the creed, which declares that the Holy Spirit proceeds from the Father and the Son (*Filio*). But at the imperial court P. lost favour that same year, and Ignatius was restored, but on the latter's death, 879, he again became patriarch, recognised this time by Pope John VIII. But the Ignatian party was not extinct, and in 886 the Emperor Leo VI permanently exiled P. Treated as a saint by the Gk Church, and as an arch-enemy and

worker of div. by the W., he has been successfully vindicated by the orthodox scholar, Dvornik, as a great churchman, a learned and cultivated scholar, and a genuine Christian, who shared but did not inspire the anti-W. prejudices of his time. His outburst against Rome in 869 acquired a historical significance out of all proportion to its importance in his own life. The causes of the schism undoubtedly lay deeper, in the age-long inability of E. and W. to believe each in the good faith of the other. See Migne, *Patrologia Graeca*, vols. ci-civ, 1860; J. Ruinart, *Le Schisme de Photius*, 1911; M. Jugie, *Photius et la primauté de S. Pierre et du pape*, 1921; E. Orth, *Photiana*, 1928; F. Dvornik (Orthodox), *The Photian Schism, History and Legend*, 1948; P. Hughes, *History of the Church*, vol. II, pp. 161-81 (end ed.), 1948.

Photo-chemistry, branch of chemistry which deals with chemical reactions initiated, assisted, or accelerated by exposure to light. Typical examples are the formation of carbohydrates (q.v.) from carbon dioxide, CO₂, absorbed from the air, and water from the soil, in the presence of sunlight by green plants containing chlorophyll (q.v.); the combination of hydrogen and chlorine, which is explosively rapid on exposure to sunlight but only very slow in the dark; the sensitivity of silver salts to light, which is so important in photography (q.v.); and the formation of vitamin D by humans and animals from sterols in the skin in the presence of sunlight. Chemical reactions may not be confined to any particular wavelength, though some rays are more active than others, notably the ultra-violet and actinic. Light may act to energise a reaction or to change the natural course of a reaction.

Photo-composing, see FILM-SETTING.

Photo-electricity. The photo-electric effect is the emission of electrons (q.v.) from a metallic surface when light of an appropriate colour or wavelength falls on it. The first hint of this effect was discovered in 1887 by Hertz (better known for his researches on electromagnetic waves, q.v.), who found that when ultra-violet light (q.v.) was directed on a spark gap the electric discharge occurred at a lower voltage. In 1888 Hallwachs found that a body charged with negative electricity could be discharged by directing a beam of ultra-violet light on it. The nature of this curious effect was explained by Lenard and J. J. Thomson following the discovery of the electron by the latter. The facts that the emission of electrons begins immediately the light falls on the metallic surface, and that the maximum speed of the ejected electrons depends only on the wavelength of the light falling on the surface, were explained when Einstein applied the quantum theory (q.v.) to the problem. A simple type of photo-electric cell is shown in the diagram. It is a small glass cell coated on the inside with a deposit of potassium or other alkali metal, distilled into the cell while the latter is highly evacuated. The surface

near E is left quite clear of the metal. A trace of the inert gas argon is then introduced and the cell is sealed off. R is a thin metal ring connected to the pin D, and the metallic deposit is connected by a wire to the pin A. B and C are 'dummy' pins fixed in the base of the mount so that the cell may be held in an ordinary valve holder. An alkali metal is used because, other things being equal, the photo-electric effect is greatest with these metals in ordinary light. The ring R is kept at about +150 volts relative to the film, so that the electrons flow from it to the ring.

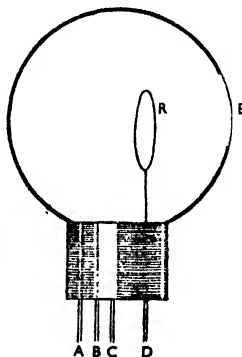


PHOTO-ELECTRIC CELL

The electric current so caused is very minute, but it can be amplified by means of an ordinary electronic valve (q.v.), and the amplified current can be made to operate a relay that acts as a switch in an electrical circuit. The photo-electric cell when coupled up in this way behaves like an automatic eye. Photo-electric cells are now used, for example, to switch on the lamps in large buildings and station goods yards whenever the intensity of the daylight falls below a given level. They are used as burglar alarms, operating the bells when a beam of light falling on the cell is interrupted. Similarly, they are used extensively in counting-machine units, recording each unit on an illuminated board as it passes in front of the cell. As these cells are sensitive to changes in the colour of the light falling on them they are used for such purposes as detecting atmospheric pollution; rejecting discoloured peas *en route* for bottling; rejecting proprietary articles that have accidentally shed their labelled wrappers. But the most important application of the photo-electric effect so far is the invention of talking films. See CINEMATOGRAPH; SILENT FILMS; PHOTOMULTIPLIER; PHYSICAL CONSTANTS.

Photo-engraving, see PROCESS WORK.

Photo-lithography, see under LITHOGRAPHY.

Photo-sensitive Glass, see GLASS, Coloured Glass.

Photogrammetry, surveying by means of photography, usually based on a previous triangulation. Camera stations are selected from suitable survey stations, and placed at other points whose position and elevation are determined such that each part of the region is covered by 2 photographs, from different stations, and each photograph contains at least one known point. The camera must be fitted with level and levelling screws. A theodolite is used for angular location of stations; in modern instruments a theodolite is incorporated with the camera. As the plate gives a perspective picture, plotting is a process of reverse perspective drawing ('iconometry'). The method is suitable for mountainous regions, where ordinary field surveying is impossible. The field work is reduced to $\frac{1}{2}$ in time. It is useless in flat country unless carried out from the air. See AERIAL SURVEYING. See E. Deville, *Photographic Surveying*, 1895; O. v. Grabor, *Photogrammetry*, 1932; J. A. Flemer, *An Elementary Treatise on Photographic Methods and Instruments*, 1906.

Photography, recording of light-images by means of light-sensitive substances.

History and Methods. In 1802 Thomas Wedgwood, son of Josiah Wedgwood the potter, pub. an account of experiments carried out by Sir H. Davy and himself in a method of copying paintings on glass and of recording profiles by the action of light upon silver nitrate. But these images could not be fixed, as the unaffected portion of the emulsion was not removed. In 1814 Niepce obtained images on a bituminous film. Later he experimented with Daguerre (q.v.); and 6 years after Niepce's death (1839) the latter pub. particulars of his Daguerreotype process, in which a metal plate coated with silver iodide was exposed in the camera and subjected to vaporised mercury in a dark room. A positive image was produced direct, darks and lights in the subject so recorded. The Daguerreotype was the first practical process, and produced excellent results, but it bears little historic relation to present-day processes, which have more directly evolved from the work of Fox Talbot, an Eng. contemporary of Daguerre. Fox Talbot pub. (1839) particulars of his first process, a method of photogenic drawing with the image produced on paper coated with chloride of silver and fixed by solution of silver chloride and potassium bromide. Later hyposulphite of soda became generally used to dissolve out the unwanted silver and so to 'fix' the image. In 1841 Fox Talbot patented his Talbotype or Calotype process. Fox Talbot's processes resulted in a negative image (darks and lights in the subject reversed) on paper. A positive print was obtained by printing through this negative on to another sheet of sensitised paper. The development since Fox Talbot's time has been rapid. J. B. Reade proposed a *developer* (c. 1842) to increase the effect produced by light. In 1848 Niepce de St

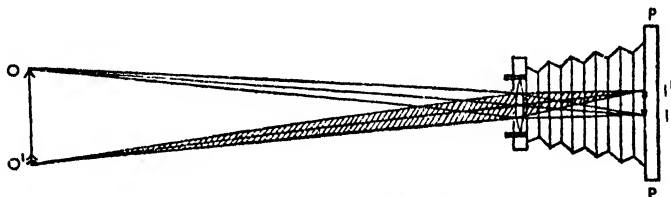
Victor suggested glass with a coating of albumen to replace paper for negatives. In 1851 Le Gray and Scott Archer separately proposed the use of collodion as a vehicle for the sensitive salts, the latter publishing an account of his collodion wet-plate process. The collodion process was an excellent one; it is used largely to-day with little alteration by process engravers, but the plate had to be exposed while the emulsion was still wet. In 1871 Dr R. L. Maddox used a gelatine emulsion to hold the silver bromide salts, and this could be dried after coating and before exposure, doing away with the need for a portable dark room. The dry plate was improved in sensitivity and other qualities. In 1884 George Eastman placed on the market the first roll-film, celluloid taking the place of glass, and in 1891 he introduced a daylight loading film. From this P. as a popular hobby may be said to date. Recent improvements in sensitive materials have largely been in increased sensitivity and in the improved rendering of coloured objects in monochrome. The early emulsions were sensitive only to light of short wavelengths, blue, violet, and the invisible ultra-violet. Such colour-blind emulsions are still made, and plates coated with them are known as ordinary. By the addition of certain sensitising dye-products emulsions can be made sensitive also to yellow and green (orthochromatic) and, in addition, to red (panchromatic). Most emulsions are still unduly sensitive to blue light, and filters are used to correct this imperfect sensitivity or to emphasise or minimise the relative brightness of coloured objects when reproduced in monochrome. A yellow filter on the lens will darken a blue sky and thus show up the whiteness of clouds. Considerable penetration of haze can be effected by the use of suitable filters, and under certain conditions the use of filters can reveal in a photograph details invisible to the human eye.

The camera, essentially a light-tight box with lens at one end and a place for the sensitive plate or film at the other, was developed from the camera-obscura (q.v.). Modern developments have been largely in the direction of compactness and in the lenses fitted. Simple lenses, those composed of a single glass, have a number of defects when used for P. Chromatic aberration, the bringing into focus of light of different colours at different distances from the lens instead of on one plane, is corrected by cementing together two lenses made of different glasses; this is the Meniscus Achromatic. As only the central area of a single lens gives a sufficiently clear-cut image, a 'stop' is used to cut out the edges. This causes distortion, the form depending on whether the stop is behind or in front of the lens. By placing a lens on each side of the stop, the two distortions balance, and an undistorted image is produced; such a doublet lens is known as a rectilinear. Three aberrations remain: spherical aberration, the production of

an image slightly unsharp all over unless only a small central area of the lens is used; curvature of field, the tendency in simple lenses to bring objects into sharp focus in a curved field, not on a flat one, such as is provided by plate or film; and astigmatism, a complex fault making it impossible to focus sharply at the same time vertical and horizontal lines. A high degree of correction of these aberrations is found in the anastigmat lens, often a combination of up to 8 different elements, the practical advantage of which is the sharpness of the images produced even when practically the whole area of the lens is used. With such a lens far more light is passed to the film during a given period than when a small stop has to be used to cut out the uncorrected rays from the edges of a simple lens.

In the early days it was the usual practice to take a negative of the size in which the finished print was required. To-day, owing to production of precision cameras and the more critical definition of the

in a solution which transforms it from one of various degrees of light and dark to one of various degrees of stickiness. The print is then dabbed over with pigment, which adheres in various degrees according to the stickiness of the various parts, and the tones of the picture are thus reproduced in pigment; considerable latitude is possible in the building up of the pigment image. Bromide and gas-light are development papers, the process being to expose, develop, fix (to remove the undeveloped sensitive salts), and wash, as in making negatives. Other printing papers are known as print-out papers, because the image is printed out to its full depth, the print being finished by toning to the desired colour and fixing; with self-toning printing-out papers toning and fixing are combined. In platinotype paper the image was formed of metallic platinum; the paper was expensive, but the results were of exceptional quality and permanence. Carbon printing depends upon the hardening of dichromated



THE PRINCIPLE OF THE CAMERA

OO' is the object. The convex lens of the camera is pulled out so that it forms a real, inverted image I' on the sensitive plate PP. Thus by varying the distance of the plate from the lens it is possible to form images on the plate for various positions of the object.

modern anastigmat lens and the finer grain of negative-making materials, small negatives are commonly taken and enlarged prints made by projecting an enlarged image of the negative on to sensitive paper. This has led to a vogue called miniature P. with a press of its own. The sensitive paper used for enlarging has an emulsion similar to that on films or plates, but not so speedy; this is bromide paper. Prints of various colours can be produced by using chlorobromide papers, the emulsion of which is a mixture of chloride and bromide of silver, the ratio of the two halides determining the colour and speed. Multi-grade is a modern bromide paper with unique characteristics. Two emulsions, one soft in gradation, the other contrasting and sensitised to blue-green light, are coated on to a single base. The use of suitable filters in printing or enlarging can be made to alter the contrast of the result. Gaslight paper is less sensitive, and can be worked in dim artificial light, and no dark room is necessary. The Bromoil process favoured by many pictorial photographers is based on a print on bromide paper. The image is bleached

gelatine on exposure to light; the image is of carbon pigment in gelatine; those portions of the impregnated gelatine which have not been hardened by light action are washed away by the application of warm water. An image similar to that of a carbon print, but not necessarily pigmented, can be used as a resist in etching designs, etc., on to metal or glass.

A camera with unique features has been produced in the U.S.A. It is the Land one-minute camera, and is made to take 2 spools, one of negative and one of positive paper. After exposure the ends of the 2 spools of paper are pulled out together to a predetermined stop, and as they pass between two rollers in the camera a narrow bag of paper extending across the positive paper is burst. The bag contains the processing solution, which is squeezed into close contact with the exposed negative paper. The unused silver compounds diffuse or migrate to the positive paper, there to be reduced by the solution to form a positive image. The finished quarter-plate print can be removed from the camera a minute after the operation has commenced.

Colour Photography. As early as 1785

Senebier pointed out that when a spectrum was thrown on to silver chloride violet and blue were reproduced. In 1812 in his book *Zur Farbenlehre*, Goethe printed an account of the researches of Seebeck, the great Ger. physicist, into the action of coloured illumination upon silver chloride. During the next 80 years investigations were conducted along these lines by many famous men, including John Herschel, Hunt, Niepce de Saint Victor, Poitevin, Becquerel, Zanker, and Wiener.

In 1891 Lippmann gave an explanation of the theory of interference and exhibited actual photographs of colours produced by his method. Lippmann used a transparent gelatine emulsion of silver bromide exposed in contact with a mercury reflector. The light passing from the subject through the emulsion was reflected back along its path by the reflector. Where 2 trains of light-waves interfered the emulsion was unaffected, but where they reinforced each other a series of planes of metallic silver was produced on development, and the distance apart of those planes depended on the wavelength of the light. The result, when viewed at the angle of maximum reflection, was a photograph in colours corresponding to the actual subject. The systems in use to-day are indirect and based on the Young-Helmholtz theory that all colours may be matched for the human eye by mixing in various proportions light of the 3 colours, blue, green, and red. There are 2 main systems, the additive and the subtractive.

In the additive processes 3 negatives are exposed through red, blue, and green colour filters respectively. Positive transparencies are made from these and each projected through a filter of a colour similar to that used in exposing the corresponding negative, all 3 images being combined or added to each other in register on a screen as demonstrated by Clerk-Maxwell in 1861, or viewed in a device which combines all 3 images in an eyepiece (Cross, 1879; Ives's Kromsköp, 1902). The most widely used of the additive processes were the screen plates or films, 1896: Autochrome, 1907; Warner-Powrie, 1907; Omnicolors, 1907; Thames, 1908; Paget, 1913; Agfacolor, 1924; Finlay, 1929; Dufaycolor Roll Film, 1935. This method used a mosaic of blue, green, and red filters on a glass plate or film support. A panchromatic emulsion was coated on to the mosaic; the plate was exposed so that the light passed through the mosaic to the emulsion; the plate was then processed by reversal to a positive and could then be viewed by transmitted light or projected on to a screen. In the Autochrome the mosaic was made of dyed starch grains. The Paget process employed a separate taking screen, and from the resulting negative a positive was made and bound up in register with a viewing screen.

In 1869 Ducois du Hauron proposed the subtractive method in which the positive images from separation negatives made

through red, blue, and green filters were converted into a dyed or otherwise coloured image, complementary in colour to that of its taking filter, the amount of colour being proportional to the amount of silver developed in the positive. The colours used are known as subtractive or complementary: thus the positive from the negative taken through red filter is coloured blue-green, the positive from the green separation negative is coloured magenta, and the positive from the blue separation negative is coloured yellow. When these coloured positives are superimposed a colour print or transparency is produced which may be viewed either by reflected or transmitted light.

Sanger-Shepherd (1900) used gelatine-coated film sensitised in potassium dichromate to hold his dyed image. Pinotype (1905) was a similar process. In the 2-colour Kodachrome film (1914) 2 colour-separation negatives, exposed through red and blue-green filters respectively, were developed and treated in a ferric chloride bath which bleached the image and simultaneously softened the gelatine adjacent to each particle of silver. These softened areas were stained in blue-green and orange dyes and the images bound in register. The method was adapted to cinematography by making the prints in register on each side of a double-coated film. Kodachrome film (1936) uses 3 emulsion layers on a film support. The top layer is sensitive only to blue light, the middle layer records the green, and the bottom layer the red. After development to a negative the residual silver bromide in each layer is exposed and independently developed in coupler developers. Coupler developers deposit dye of predetermined colours wherever they develop silver bromide to silver. Different coupler developers are therefore used for each layer, and when the positive silver image is dissolved away a subtractive colour photograph built up from a yellow, magenta, and blue image results. The Agfacolor process (1936) seems similar, but the 3 coupling components are included in the 3 layers during manufacture. Technicolor (1934 and 1938) (q.v.), much used in cinematography, is a 3-colour imbibition process employing 3-colour separation negatives made simultaneously in a special 'beam-splitting' camera. Ilford Colour Film 'D' (1948) is an integral tripack process which does not carry colour-formers and must therefore be laboratory processed. Gevacolor (1948) is a multi-layer colour transparency material of the reversal and colour development type. Kodak Ektachrome film is a reversal processed sheet film in which the coupler components of the dyes are incorporated in the emulsion layers during manufacture and a single-colour developer serves to produce all 3 positive dye images. Ferranicolor (1949), a process developed in Italy, seems to have some affinity with Kodacolor (1942).

Of the subtractive colour processes producing prints on paper the most successful has been Three-colour Carbro

(1902), in which carbon tissues, yellow, magenta, and blue, are sensitised in dichromate, dried, and exposed through the 3 appropriate separation negatives. After development in warm water the 3 dye images are superimposed in register on a final support. Three-colour Carbro uses 3 bromide prints made from the 3 separation negatives. These are squeezed into contact with yellow, magenta, and blue carbon tissue which has been sensitised in dichromate and ferricyanide. The silver image is reduced and reacts with the dichromate, producing local hardening. Washing away the soluble gelatine leaves dye images which are superimposed on to a final support. Vivex (1932), a modified form of Carbro, was a largely used commercial process. Kodak Wash-off Relief (1934) used bromide prints on a safety-base support. After exposure behind the 3 separation negatives through the safety-base support the images were developed and the images bleached with simultaneous hardening of the surrounding gelatine. Soluble gelatine was removed with warm water, leaving hardened reliefs. These were soaked in dyes of complementary colours to the taking filter used in making the negative. The dye images were transferred under pressure from the reliefs to mordanted gelatine-coated paper, the 3 superimposed images producing a colour print. The improved dye-transfer process (1946) used a tanning developer for the reliefs. Dufaycolor (1938) was a modified carbon process. Dufay tissue (1945) was a Carbro process using printing material with a cellulose acetate base. In the wet carbon process (1944) carbon tissues are exposed whilst still wet behind separation negatives. Minicolor (1941) and Kotachrome were designed for the mass production of colour prints from Kodachrome transparencies. Both processes use 3 emulsions coated on an opaque white safety base. Kodacolor Roll Film 2 (1942) was an integral tripack on roll-film support in which the coupling compounds used to produce the dye image were included in the emulsion. A single developer was used, and when the negative silver images were reversed a negative dye image in colours complementary to those of the subject was left. The negative was printed on to paper carrying a similar set of emulsions, and after similar processing a positive colour photograph was obtained. Very beautiful 'metal-chrome' colour prints were exhibited during 1949. Since that date there have been general improvements in all types of sensitive materials, especially in regard to speed ratings of both black-and-white and colour films. In addition to a range of direct reversal subtractive processes, particularly for 35-mm. miniature format cameras, offered by several manufacturers, there have also been improvements in negative-positive colour materials. Some processes remain entirely under the control of the manufacturers, but there are a number of others which

can be processed by the user—this also applies to those types in which a negative in complementary colours and tones is produced for subsequent printing on to an appropriate opaque (generally, but occasionally transparent) material to produce a positive image in colour closely approximating to the original subject.

Lately the prin. developments in apparatus have been in the 35-mm. miniature and 2½-in.-sq. camera fields; either exposure-meters or range-finders or both may be incorporated, and, in some cases, the exposure-determining device may be automatically coupled to the iris or shutter mechanism in an endeavour to make the equipment as nearly fool-proof as possible in the hands of the veriest amateur.

See also manuals, hand-books, and other literature of the principal manufacturers, e.g. Agfa, Gevaert, Ilford, and Kodak; as well as the book-lists of the publishers specialising in photographic literature, e.g. Focal Press, Ltd., and Fountain Press, Ltd., London.

JOURNALS: (weekly) *British Journal of Photography*, 1860, and *Amateur Photographer*, 1884; (monthly) *R.P.S. Photographic Journal*, 1853, *Photography*, 1945, *Good Photography*, 1938, *Miniature Camera Magazine*, 1936, now *Modern Camera Magazine*, *Miniature Camera World*, 1936, *Amateur Cine World*, 1934; (bi-monthly) *R.P.S. Journal of Photographic Science*.

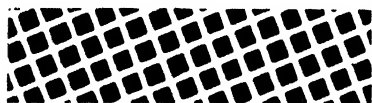
Infra-red Photography, see INFRA-RED RAYS. See also CHROMO-CHROME; CINEMATOGRAPHY; LENS; LITHOGRAPHY; PHOTOGRAPHY; PHOTOMICROGRAPHY; TECHNICOLOG.

Photogravure is an intaglio process: the ink which forms the printed image is retained in hollows in a metal plate or cylinder before being transferred to paper by means of pressure in a press. There are two kinds of P.: (1) that which is printed from a plate; (2) that which is printed from a cylinder. Plate printing can be further subdivided into: (a) the kind where the continuous tone of the original picture is split up into a multitude of dots by means of a screen very similar to the one used for making half-tone blocks (see PROCESS WORK); (b) the kind where the tone is split up by means of a grain not unlike that of aquatint (q.v.).

Plates can be printed in two ways. The first by means of a platen similar to that of a letterpress machine. In the second method a thinner plate is employed which is bent round a cylinder and printed in the same way as a solid cylinder. More typical of P. is the method of using a cylinder which is particularly economical for long runs. The cylinder has an iron or steel core on which a shell of copper is deposited by revolving the cylinder in a tank of copper sulphate through which an electric current is passed.

The course of one particular method employed for the production of a popular magazine may here be followed. While the reading matter is being set in type, paper negatives are made of the pictures, and the type, when correctly set, is printed

with almost white ink on a shiny black paper, and dusted with white powder which sticks to the printing and intensifies the image. This is in effect a negative. The negatives of the pictures and the negatives of the type are pasted together in correct relation to one another, forming one negative of the whole page. The complete negative is then photographed on a film resembling that used in a normal snapshot camera, but a little thicker. The result is a positive, which is an exact image of the page as it will appear when printed. Film negatives and a positive type printing on transparent paper are used for better-class work.



Sun
Printers
Ltd.

PHOTOGRAVURE SCREEN AND CELLS

Above. Portion of a screen magnified 23 times. The white lines assist in forming the walls of the cell which retain the ink on a cylinder.

Below. Diagrammatic cross-section of cell formation on a cylinder, magnified 23 times. The cells in the darkest shadows of an illustration (as A) are seven-eighths of one thousandth of an inch deep and those in the highest lights only about one-tenth of a thousandth of an inch.

The positives of the individual pages are then carefully 'planned' over a lay-out on a sheet of glass, so that the pages, when folded and trimmed, will fall in their correct sequence. It should be remembered that the negatives just referred to are of opaque paper, while the positives are made of transparent film.

The sheet of positives is now ready for transferring to the copper cylinder, and this is done by means of carbon tissue. Carbon tissue is paper coated with gelatine and made sensitive to light. It is 'squeegeed' on glass and when dry stripped off. This tissue is exposed to light behind a screen. The screen used is different from that used for making a normal letterpress half-tone block, being composed of a lattice work of white lines that leave tiny squares of black between as in the diagram. Immediately after printing the screen, the sheet of positives is printed on the same tissue, which therefore has a combined image composed of the picture and a superimposed network of white lines. The object of the screen is to split up the image into an immense number of square cells which will later be etched. The tissue is

then soaked in hot water which enables the paper backing to be peeled off. This gelatine image will vary in thickness according to the amount of light which penetrated through the positive when it was printed. After carefully protecting the margins and any parts of the cylinder not required to print, it is etched. The result on the copper will be a multitude of square pits of depths varying according to the tone of the original. The process is carried out by slowly revolving the cylinder in a trough while the etcher pours the solution over it from jugs, using different strengths to suit the differing needs of the various pictures and type. In good-class work it is desirable to give the type areas on the cylinder a separate 'line' etching from the tone portions. A very large number of prints could be taken direct from the copper, but nowadays it is more general in rotary P. to face the cylinder with chromium before printing.

The printing is effected by the cylinder revolving in a trough of ink (or in contact with a roller which revolves in the ink), and as the ink is drawn above the surface of the trough a thin steel blade (the 'doctor'), which is in contact with the cylinder along its whole length, wipes all superfluous ink from the surface. Continuing its revolution, the cylinder is brought into contact with the paper by means of a rubber-covered cylinder. The pressure is sufficient to withdraw the ink from the pits in the cylinder and transfer it to the paper. Deep pits, holding more ink, represent dark areas of the image, and shallow pits, with less ink, the light

P. is a process particularly useful for printing photographic originals in very large numbers at very high speeds. It produces a particularly rich effect from rather dark subjects. This is largely due to the fact that the dark tones in gravure carry more ink than in the light tones.

Colour Photogravure is employed in many periodicals and magazines. The method of reproducing from a coloured original by P. is on conventional lines and is similar to that which is used for 3- and 4-colour letterpress half-tone. The coloured original is photographed 3 times through a different coloured filter, i.e. a violet filter for the yellow plate, an orange filter for the blue plate, and a green filter for the red plate. The negatives which are produced correspond to the colour values of the original, but a certain amount of retouching is necessary to correct the balance of colour. A positive is made from each of the negatives, which when made up into sheet form is ready for transferring to the copper cylinders. The process follows as for monotone reproduction, but 4 cylinders are required for a 4-colour reproduction. After etching, the cylinders are ready to go on the printing press and the paper reel is fed through the machine. After each colour is printed, the web progresses through the machine over steam-heated drums, which makes the colour perfectly dry before a subsequent printing

takes place. The periodical is produced at approximately 25,000 copies per hour, the machine actually making 12,600 revolutions per hour, producing two copies at each revolution.

Flat Plate and Gravure is a process not much used now. It does not fail to produce first-class results, but it is slow and therefore costly. The plate is prepared as for an aquatint, by covering it with a dust of bitumen or resin which is made to adhere to the plate by slight heating. A carbon tissue of the desired picture is prepared as described earlier and laid on the plate and etched. No screen, of course, is used, as the dust-grain breaks up the image into an infinite number of cells. If inked and wiped and printed by hand, exquisite results can be obtained. This process is appropriate for limited eds. of plates for use in books, and for producing high-quality reproductions of works of art. If the paper is damped, even hand-made paper is practicable, which improves the quality enormously for some kinds of work. See H. Biskeborn, *Photogravure Machine Printing*, 1949.

Photometry, experimental comparison of the illuminating power of different sources of light. It affords a method of measuring this illuminating power by comparison with that of a conventional standard. The standard adopted was originally the illuminating power of a sperm candle, 6 to the pound, burning at the rate of 120 grains per hour, the illuminating power of any source being then expressed as equivalent to so many standard candles. This standard is too inaccurate for modern work, owing to the varying illuminating power of these candles. Sev. standards have been suggested, among them being the portion of a certain size flame of an Argand burner, the flame of amylacetate contained in a special lamp, and the pentane lamp. The latter is by far the most accurate. It consists of a flame of pentane vapour, mixed with a definite proportion of air, and burning in a special type of lamp, the ring burner of which is made of steatite. This lamp is equivalent to 10 standard candles. The instruments used for carrying out these comparisons are called photometers. The simplest photometers are those of Foucault, Rumford, and Bunsen. The Foucault photometer consists of a semi-transparent screen fixed at right angles to an opaque partition, which can be moved in its plane perpendicular to the screen. The 2 sources of light to be compared are placed one on each side of the screen, their distances from the screen being adjusted until each half of the screen is equally illuminated by its corresponding source; the illuminating power may be then compared according to the inverse square law (see LIGHT). The Rumford photometer effects the comparison by adjusting the intensities of 2 shadows of a vertical rod thrown on a screen by the 2 sources. The distances of the sources from the screen are adjusted until the shadows have the same intensity. The positions of the sources are also adjusted

so that the shadows are cast side by side on the screen to facilitate the comparison. By applying the inverse square law the illuminating powers may be deduced. Bunsen's grease-spot photometer consists of a screen of opaque paper with a grease spot at its centre. If a source of light be placed in front of this screen, and viewed from the remote side, the grease spot will appear brighter than the rest of the screen, while it appears darker on the other side. When 2 sources are to be compared they are placed one on each side of the screen, and their distances adjusted until the spot appears the same on both sides; these distances are then measured, and the inverse law applied. In their simple forms the above types of photometer are not used to-day, but the Lummer-Brodhun photometer is an adaptation of the Bunsen. It consists essentially of an opaque disk, part of which is illuminated by one source, while the remainder is illuminated by the other. The instrument is so arranged that both sides may be seen at the same time and their respective brightness compared. Flicker photometers have a white surface, which is alternately illuminated by 2 sources. If the sources are so placed that they illuminate the screen unequally, a flickering effect is produced. The distances of the sources from the screen are then adjusted until this flickering vanishes, when the ordinary inverse square law is applied. In all this work external lights should be excluded, and all the light from the sources should be transmitted in the same direction. Further, all the lights should be of the same colour, otherwise the equality of illumination will be difficult to determine owing to this difference in colour. It is generally found that different sources emit different coloured rays in different proportions, so that to obtain a really accurate result the light from each source should be split up into a spectrum, and each corresponding part of these spectra should be compared in turn. The direct use of the flicker photometer gives results which differ very little from the results obtained by spectra comparison. A further difficulty arises in practice because lamps in ordinary use emit unequal amounts of light in different directions, so that the measurement of the light emitted in one direction may afford a misleading estimate of the total. While it is possible to make measurements in so many directions relative to the lamp that a satisfactory average is obtained, the process is tedious, and the diffusing sphere is usually employed. This is a large sphere coated internally with a white powder, with a portion shielded from the direct rays of the lamp placed inside the sphere; the brightness of the shielded part depends upon the total amount of light emitted from the lamp, and provides a measure of it.

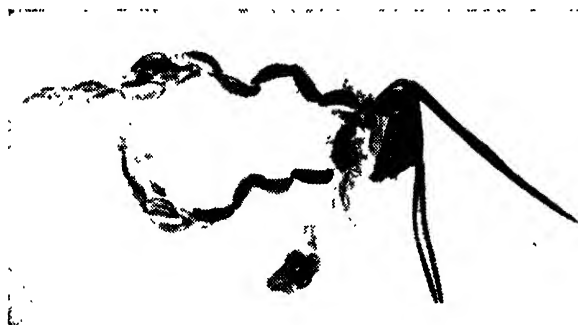
Photomicrography, production by photographic means of enlarged pictures of microscopic objects, as contrasted with microphotography, which produces minute prints, requiring microscopic

examination, from objects of normal size. The former practice is of the utmost utility in many branches of science, and is capable of yielding results of great artistic virtue; the latter was once fashionable as a scientific curiosity, and has achieved utility as a means of recording printed matter in small compass for transit or storage. The general optical considerations are treated under MICROSCOPE AND MICROSCOPY; main peculiarities of P. from the practical point of view are that a higher degree of resolution can be attained than by visual microscopy, as the blue and ultra-violet rays can be used, but that the observer of the photomicrograph is deprived of the information to be gained from alterations of focus: the picture represents an optical section, of a finite thickness that cannot be extended by ocular accommodation or mechanical adjustment, and the picture is thus less informative than the direct image, although

incapable of yielding the results possible with less highly integrated apparatus.

Advances in P. have been made possible by the introduction of plates for use in the infra-red region to exploit local transparency of normally opaque substances, or to secure differentiation by selective absorption. Ultra-violet P. has been used since 1904 to gain additional resolving power, although the development of a practical process dates from 1925, when Barnard and his colleagues developed suitable apparatus; monochromatic radiation segregated from electric spark discharges is utilised for illumination. P. in the 'near' ultra-violet, to excite fluorescence and to provide distinctive absorption pictures, has become a commonplace in every laboratory owing to the development of mercury discharge lamps.

The most distinctively photographic branch of P. is that one now termed 'cinemicrography,' which produces films



GENITALIA OF
FEMALE ICHNEU-
MON FLY
× 10

Leitz No. 1 objec-
tive, no eyepiece.
Illumination by
Kohler's system.

W. G. Hartley

it can be studied at leisure and discussed or duplicated.

Photographic recording was used as soon as it became available, the daguerreotype process being employed, and before 1880 the use of wet collodion plates for P. was well known, although the lack of convenient light sources restricted technique. The introduction of suitable dry plates is recorded in 1882, and these by their convenience and instant availability quickly ousted the wet plate. Nevertheless, until recently the wet plate was unsurpassed for resolution, owing to its freedom from grain. The technique in common use has changed little since the early days, the greatest advances having been made in the light sources available and in the sensitivity of the photographic plates. The apparatus consists essentially of a suitable microscope arranged to project a magnified image on a sensitive photographic plate, but there is a modern tendency for complete instruments to be designed, lacking the means by which the ultimate refinements of critical adjustment can be made; these are excellent for routine use, but are

inferior for projection. Apart from directly recording microscopical events, it can be used to obtain slow-motion pictures of movements too fast to follow by eye, and also to convert imperceptible changes into a visible sequence. The extreme high-speed photography possible on a large scale is limited in microscopic practice by the light intensity available or tolerable to the specimen; its main application promises to be in physiology. At the other end of the scale 'time-lapse' photography, in which the successive exposures of the film are made at intervals of seconds or hours, has proved very useful in research; nuclear division, tissue growth, cell feeding, and similar slow processes can be photographed, and projected at increased speed, with the result that the processes acquire an easily appreciated significance; the same action may, moreover, be observed repeatedly by many observers. It is notable additionally that even in the absence of 'phase-contrast' (see MICROSCOPE AND MICROSCOPY) certain regions in the cells, which would not be identified in normal observation, can be differentiated owing to the movements

of the almost imperceptible shadows. A further application of the cinematic technique is the reconstruction of a specimen by projecting a film made by photographing serial sections of it in sequence, so that the observer can see the relationships of the various parts as he is conducted through the specimen; this might be considered as providing P. with the third dimension which it lacks in comparison with visual microscopy. The modern technical practice is to use sub-standard (16-mm.) film for cinemicrography, as the definition can be maintained, whilst the problems of illumination, and of moving and exposing the film without vibration, are greatly eased.

The practical details of P. can be learned only by experience; books on the subject are J. F. Barnard and F. V. Welch, *Practical Photomicrography*, 1936; E. M. Allen, *Photomicrography*, 1941; and C. P. Shillaber, *Photomicrography*, 1945.

Photomultiplier, or Electron Multiplier, is a device which produces an easily detectable pulse of current from a small amount of light or a small number of electrons. The light from a scintillation counter (q.v.), for example, is allowed to fall on a photosensitive surface (see PHOTOELECTRICITY), and the electrons emitted are attracted to a nearby electrode or *dynode* at about 100 volts positive potential. When these electrons strike the dynode surface an average of 3 or 4 secondary electrons are emitted per incident electron. These electrons are in turn accelerated to a second dynode and a 3- or 4-fold multiplication again takes place. As many as 16 dynodes are used before the final avalanche of electrons is collected by an anode and measured by a current-sensitive device. The whole assembly is in an evacuated enclosure, and multiplications up to 10^6 are possible, but stability may then become a major problem. See SCINTILLATION COUNTER and CERENKOV COUNTER.

Photon. Although light and other electromagnetic radiations have properties explained in terms of a wave motion, they interact with matter as though they were discrete particles or quanta of finite energy (see LIGHT; X-RAYS, *Compton Effect*; GAMMA-RAYS; QUANTUM THEORY; PHOTOELECTRICITY). To emphasise the particle aspect of quanta, they are sometimes referred to as P.s or particles of light.

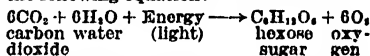
Photophone, instrument for transmitting sounds by means of a beam of light: its possibility was announced (1878) by Alexander Graham Bell (q.v.). The instrument depends on the peculiar properties of selenium, though hard India-rubber, antimony, and other substances will act. Crystallised selenium is very sensitive to light, and its electric resistivity varies with the intensity of light. The transmitter is a plane thin silvered mirror so fixed to a tube as to vibrate with sound. A beam of light is concentrated on this by a lens, so that the rays are reflected parallel. The receiver is a parabolic mirror with a selenium 'cell' at

the focus; this is placed in series with a battery and telephone receiver. The selenium cell is composed of alternate disks of brass and selenium. The rays of light falling on the transmitting mirror are scattered by its vibrations, so that they fall with varying intensity on the focus of the parabolic mirror, which causes the resistance of the cell to vary; the varying current actuates the telephone receiver.

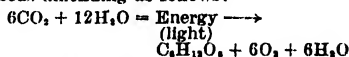
Photosphere, white-hot radiating surface of the sun (q.v.).

Photostat, see COPYING.

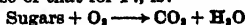
Photosynthesis (Greek *phōs*, light; *synthesis*, a building up), or **Carbon Assimilation**, the production of carbohydrates (sugar and starch) in the green leaves and other green parts of plants under the influence of light. The raw materials for the synthesis are carbon dioxide, which diffuses through the stomata of the leaves from the atmosphere (or through the epidermis from the surrounding water in aquatic plants), and water absorbed from the soil through the roots. Energy is necessary for the reaction, and is supplied in nature by sunlight, though artificial light is also effective. The first recognisable products of P. are hexose sugars, $C_6H_{12}O_6$, glucose and fructose, and the reaction may then be represented by the following equation:



Recent research with the use of isotopes of oxygen indicates that the oxygen released in P. does not come partly from carbon dioxide and partly from water, but wholly from water, and the equation needs amending as follows:



The molecules of water produced in P. are newly formed as the result of the reaction, and not identical with those at the beginning of the synthesis. The reaction is certainly more complicated than is shown by either equation, but the once widely held theory that formaldehyde played an intermediate role in the subsequent polymerisation of hexose sugar is now largely discarded. The evidence is that the first main stage of P. is the splitting of water into hydrogen and oxygen; the oxygen is evolved, and the hydrogen is used to accomplish the second great step: the reduction of carbon dioxide with the formation of sugar. Experiments with an isotope of carbon indicate that this takes place *via* intermediate products with great rapidity, without the direct use of light energy. The hexose sugars are converted by enzyme action to disaccharides (sucrose) and starch, reaching other parts of the plant by translocation. In respiration, the sugars are oxidised and their energy made available for further syntheses. The equation, the converse of that for P., is:



The energy thus released may be used in the building-up of proteins and fats in the syntheses of sugars and compounds of nitrogen, phosphorus, and sulphur which are obtained from the soil, in light and also to some extent in darkness. Experiments have proved that P. takes place only in the green parts of plants that contain chlorophyll, which absorbs the light-energy and acts as a catalyst in combining carbon dioxide and water. The importance of P. in the living world is basic. It is the direct source of carbohydrates and the indirect source of proteins and fats in green plants, which in turn are directly or indirectly used by non-green plants (e.g. fungi) and animal organisms for food and energy. By P. all living organisms ultimately derive their energy from the sun. By its production of oxygen, P. also prevents the depletion of atmospheric oxygen by such processes as respiration, combustion, and decomposition. Without P. plant and animal life would be inconceivable; only a few bacteria are able to build food by using chemical energy (*chemosynthesis*) instead of light energy. See CHEMOSYNTHESIS.

Phototropism (Greek *phōs*, light; *trōpē*, a bending or turning), or **Heliotropism** (whence the name of the plant *heliotrope*), the bending of a plant organ (e.g. a stem) in response to the stimulus of light so that the organ becomes orientated in a definite direction with respect to the direction of the incident light. Stems, coleoptiles (stem sheaths of grasses), and flower stalks bend towards the incident light, as is noticeable when plants are grown in window boxes, and are therefore said to be positively phototropic; some roots are negatively phototropic, bending away from the light (though most roots are insensitive), whilst leaf blades usually turn at right angles to the light. P. should be distinguished from phototaxis, which is a movement of a whole organism (such as a motile alga or an animal) towards or away from light; also from photonaistic responses, such as the 'sleep' movements of flowers and leaves, which bear no relation to the direction of the light. The positive P. of a stem or other organ is evidently caused by the side towards the light growing at a slower rate than the side away from the light, so that a positive curvature results. Decapitated coleoptiles do not respond, and it has been shown that the tips of the coleoptiles contain a growth-stimulating substance (hormone) whose distribution to the illuminated side is retarded, causing it to grow more slowly than the other. P. is of obvious value in enabling the organs of plants to carry out their functions efficiently. See TROPISM.

Phototype, see COLLOTYPE.

Phraates, name of 4 kings of Parthia: **Phraates I** subdued the Mardi.

Phraates II, son of Mithridates I, defeated and slew Antiochus VII (Sidetes), 127 BC, but was himself overcome in battle soon afterwards by the Scythians and his army destroyed.

Phraates III lived at the time of the war between the Romans and Mithridates of Pontus. He took no part in the war, although he formed an alliance with the Romans, but at a later period he invaded Armenia, and incurred the displeasure of Pompey. He was murdered by his 2 sons.

Phraates IV was renowned for his cruelty, which eventually produced a rebellion against him. He was driven out of the country, but restored by the Scythians. He was poisoned in AD 2.

Phragmites, see REED.

Phrase, in music, a succession of sounds either in melody or harmony, forming a definite melodic or thematic feature, and a more or less clearly marked period within the larger structure of a complete piece or period.

Phrenology, pseudo-science based on the assumption that 'faculties' are localised in the brain, and that these areas are identifiable from peculiarities of bone formation on the skull. Phrenologists profess to discover an individual's talents by locating these 'bumps' or areas. The bones of the cranium have thicknesses and air spaces producing exterior unevenness having no relation to the cortex within; localisation exists (see BRAIN), but has no connection with external variations in the shape of the head. The subject was opened by Dr F. J. Gall in 1796 in Germany, with a 'map' of 30 faculties. Spurzheim, G. and A. Combe, and Dr Elliotson were the exponents in Britain. Phrenological societies sprang up in Britain about 1832, but strenuous opposers were found in Sir C. Bell, Sir W. Hamilton, Jeffrey, Brown, Brougham, etc. The subject has since then been in ill repute among doctors and scientists, though in 1901 Dr Bernard Hollander pub. *The Mental Function of the Brain, or the Revival of Phrenology*, in which he collected a large number of instances where similarly placed lesions of the brain produced similar effects in character. He considers the case for localisation scientifically estab., but is wary in extending his support to external 'bumps.' See J. Fowler, *Practical Phrenology*, 1846; A. Bain, *On the Study of Character, including an Estimate of Phrenology*, 1861; J. P. Blackford, *Phrenology for Students*, 1916; J. Coates, *Phrenology*, 1920; and W. Asquith, *Phrenology*, 1940; also the *Phrenological Journal*, 1824, *et seq.*, and works cited under GALL, FRANZ JOSEPH.

Phrygia, country of Asia Minor, which was of different extent at different periods. Under the Rom. Empire P. was bounded on the W. by Mysia, Lydia, and Caria, on the S. by Lycia and Pisidia, on the E. by Lycosonia (which is often reckoned as a part of P.) and Galatia (which formerly belonged to P.), and on the N. by Bithynia. The Phrygians are mentioned by Homer as settled on the banks of the Sangarius, where later writers tell of the powerful Phrygian kingdom of Gordius and Midas. It would seem that they were a branch of the great Thracian family originally settled in the NW. of Asia Minor as far as the shores of the Hellespont and Pro-

pontis, and that the successive migrations of other Thracian peoples, as the Thyni, Bithyni, Mysians, and Teucrians, drove them further inland. P. was conquered by Croesus, and formed part of the Persian, Macedonian, and Syro-Grecian empires; but, under the last, the N.E. part was conquered by the Gauls, and formed the W. part of Galatia, and under the Romans was included in the prov. of Asia. The earliest Gk music, especially that of the flute, was borrowed in part, through the Asiatic colonies, from P. With this country also were closely associated the orgies of Dionysus and of Cybele, the Mother of the Gods, the *P. Mater* of the Rom. poets. After the Persian conquest, however, the Phrygians became proverbial among the Greeks and Romans for submissiveness and stupidity. The Rom. poets constantly use the epithet Phrygian as equivalent to Trojan. The Thracophrygian group of languages were Indo-European, but too little is known of them to fix their place in linguistic affiliations. Some scholars consider anct Phrygian as part of a large group, termed Thracolillyrian, of which Armenian and Albanian are held to be remnants. See W. N. Ramsay, *The Cities and Bishoprics of Phrygia* (vol. i), 1895-7, and W. H. Buckler and W. M. Calder, *Monuments and Documents from Phrygia and Caria*, 1939.

Phryne (c. 340 BC), celebrated courtesan of anct Athens, was the daughter of Epicles, and was born at Thespie in Boeotia. Hyperides the orator, Apelles the painter, and Praxiteles (qq.v.) the sculptor were among her lovers. She served as model for the 'Venus Anadyomene' of Apelles, and the 'Cnidian Venus' of Praxiteles.

Phrynichus: 1. Athenian tragic poet, was probably a disciple of Thespis. He produced his first tragedy in 511 BC, twelve years before Aeschylus (499). He was the first to use masks representing female persons in the drama. Herodotus (book vi) relates that when his *Capture of Miletus* was exhibited on the Athenian stage the audience burst into tears, so moved were they by the vivid representation of the sufferings of a kindred people. He further relates that P. was fined 1000 drachmae for producing the play, and that a law was passed forbidding it ever to be shown again. His last work was produced in 476. See A. W. Pickard-Cambridge, *Dithyramb, Tragedy, and Comedy*, 1927.

2. (fl. 429 BC). One of the most distinguished poets of the old comedy, was probably the son of Eunomides. His writings are characterised by their elegance and vigour, and there is probably no ground for Aristophanes' attack on him in the *Frogs* for the use of low buffoonery. He is said to have invented the 'Tonic a Minore Catalectic' verse which was named after him.

3. Gk sophist and grammarian, was probably a native of Bithynia. He lived in the reigns of Marcus Aurelius and Commodus, and is chiefly remembered for his *Sophistical Equipment*. He also wrote a

Selection of Attic Words and Phrases which has survived. See W. G. Rutherford, *The New Phrynica*, 1881.

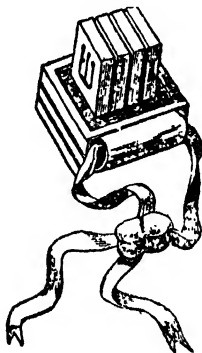
Phthalocyanines, form a small but extremely important group of dyestuffs used in paints (q.v.). They are composed of four molecules of phthalonitrile, $C_6H_4(CN)_2$, attached to a central nucleus, which may be 2 atoms of hydrogen or an atom of copper or other metal. The colours, which are brilliant and strong, range from green to blue and have excellent fastness to light, heat, and acids and alkalis. Monastral Blue B was the first to be produced, and is copper phthalocyanide.

Phthiotis, dist. of Thessaly, bounded on the S. by the Malia Gulf, and on the E. by the Pagasaeon Gulf. Homer calls it Phthia, and mentions a city of the same name as the home of Achilles.

Phthisis, see TUBERCULOSIS.

Phyfe, Duncan, see FURNITURE.

Phylacteries, called by the Jews *tephillin*, small cubical leather cases, 2 in number, one of which is worn on the forehead, the other on the inside of the left arm above the elbow. Each contains a strip of parchment or vellum inscribed with certain texts, viz. Exod. xiii. 1-10 and 11-16; Deut. vi. 4-9 and xi. 13-21. The practice of wearing P., based on Exod. xiii. 9 and 16 and Deut. vi. 8-9 and xi. 18, began in anct times (see Song of Sol. viii. 6, and Prov. iii. 3 and vi. 21) and is still continued by strict Jews at the weekday prayers.



PHYLACTERY

Phyllite, fine-grained foliated metamorphic rock in which the lustre of the disseminated mica is very prominent.

Phylloxera, genus of Aphidae or plant-lice. *P. vastatrix* is a native of N. America, and the most dreaded insect pest of the grape vines. It appeared in Europe, along with imported vines, between 1858 and 1863. The life cycle of the insect is complex, and it is in the parthenogenetic stage of reproduction that it is excessively

prolific. The female, after pairing with a male, lays only one egg, and this may hatch in autumn or survive till the following spring, and then hatch into a wingless larval form, which after a moult lays great numbers of eggs. These in hatching give rise to galls either on the leaves or in the roots, which seriously interfere with the functions of the plants. In the autumn, after sev. generations of wingless females, winged forms appear, and these after finding new plants or a healthy vineyard lay large and small eggs, the larger becoming females and the smaller males. Control measures include the use of resistant varieties of vine, and quarantine regulations in dists. where outbreaks occur; infected vineyards are sometimes flooded when circumstances admit.

Phylogeny, see MORPHOLOGY.

Physalis, see PORTUGUESE MAN-OF-WAR.

Physalis, a genus of Mexican and Amer. ann. or perennial herbs, family Solanaceae, about 100 species; *P. peruviana*, the Cape Gooseberry, and *P. ixocarpa*, the Jam-berberry or Tomatillo, are often grown for their fruit; *P. alkekengi*, the Bladder Cherry, for its ornamental lantern-like fruits.

Physeter, see CACHALOT.

Physic Nut, see JATROPHA.

Physical Chemistry, see CHEMISTRY.

Physical Constants. Most of the values listed below are taken from G. W. C. Kaye and T. H. Laby, *Tables of Physical and Chemical Constants*, 1956.

See also PHYSICAL UNITS; METROLOGY; ELEMENTS.

A useful selection is given in W. H. J. Childs, *Physical Constants*, 6th ed., 1951, and a comprehensive single vol. ann. reference book is the *Handbook of Chemistry and Physics* (Chemical Rubber Publishing Co.).

ASTRONOMY AND GEOPHYSICS.

Sun.

Distance to earth	. . . . .	149.50 × 10 ⁶ km.
Rotation period	. . . . .	25.38 days.
Radius	. . . . .	695.6 × 10 ³ km.
Mass	. . . . .	333,430 × mass of earth.
Density	. . . . .	1.414 g. cm. ⁻³ .

Moon.

Distance to earth	. . . . .	384,403 km.
Mean Sidereal month (time for return to same Right Ascension)	. . . . .	27.322 days.
Mean Synodic month (time for return to same phase)	. . . . .	29.531 days.
Radius	. . . . .	1738 km.
Mass	. . . . .	7.33 × 10 ²² g.

Earth.

Equatorial radius	. . . . .	6,377,388 metres (3963.339 m.)
Polar radius	. . . . .	6,356,012 metres (3949.997 m.)
Mass	. . . . .	5.976 × 10 ²⁷ g.
Mean density	. . . . .	5.517 g. cm. ⁻³ .
Surface area	. . . . .	5.101 × 10 ¹⁸ cm. ² .

(29.2% land, 70.8% ocean).

Gravity.

Universal constant of gravitation	. . . . .	$G = 6.670 \times 10^{-8} \text{ cm.}^3 \text{ g.}^{-1} \text{ sec.}^{-2}$.
Acceleration due to gravity (at Teddington).	. . . . .	$g = 981.183 \text{ cm. sec.}^{-2}$.

Planets.

Planet	Sid. period in trop. years	Distance from sun (10 ⁶ km.)	Mass (Earth = 1)	Mean density (g. cm. ⁻³)	Rotation Period
Mercury	0.240852	57.87	0.056	5.6	88 days
Venus	0.615210	108.14	0.817	5.15	225 days
Earth	1.000039	149.50	1.000	5.516	23 hr. 56 min. 4 sec.
Mars	1.880888	227.79	0.10778	3.94	24 hr. 37 min. 23 sec.
Jupiter	11.86223	777.8	318.354	1.337	9 hr. 50 min. 30 sec.
Saturn	29.45772	1426.1	95.222	0.690	10 hr. 14 min.
Uranus	84.01338	2869.1	14.580	1.35	10 hr. 48 min.
Neptune	164.7935	4496	17.264	2.24	15 hr. 40 min.
Pluto	248.4302	5899	0.93	(50)	?

PROPERTIES OF MATTER.

Density (g.cm.⁻³ at 20° C.).

Alcohol	0.7893	Gold	19.3
Aluminium	2.70	Iron	7.85
Balsa Wood	0.12-0.2	Lead	11.34
Bone	1.9	Lithium	0.534
Brass	8.4-8.7	Mercury	13.55
Cork	0.22-0.26	Sodium	0.97
Glass	2.4-2.8	Uranium	18.7
		Water	1.00

Elasticity.

<i>Substance</i>	<i>Young's Modulus</i> (10 ¹¹ dyn. cm. ⁻²)	<i>Poisson's Ratio</i>	<i>Breaking Stress</i> (10 ⁸ dyn. cm. ⁻²)
Brass	9.7-10.2	0.34-0.40	2.5-5.5
Glass	5.1-7.1	0.13-0.32	0.3-0.9
Rubber	0.00015-0.0005	0.46-0.49	—
Steel	20-21	0.25-0.33	11-23

Surface Tension (dyn. cm.⁻¹).

Water	72.75 (20° C.), 58.8 (100° C.)
Mercury	472 (20° C.)
Benzene	28.88 (20° C.)

Vapour Pressure (mm. Hg at 20° C.).

Carbon disulphide	298	Mercury	0.0013
Ethyl alcohol	44.5	Water	17.5

LIGHT.

Refractive Index (for Helium d line-yellow- $\lambda = 5876 \text{ \AA.}$).

Borosilicate crown glass	1.5097
Dense barium crown glass	1.6123
Extra dense flint glass	1.7004
Carbon disulphide	1.6279 (20° C.)
Diamond	2.4173
Water	1.3330 (20° C.)
Quartz (for Sodium D, $\lambda = 5893 \text{ \AA.}$)	1.4584
Alcohol	1.3610 (20.5° C., Sodium D line)

Wavelengths (Angstrom units, 10⁻⁸ cm.).

Cadmium red line	6438.4696
Sodium yellow	$D_1 = 5895.932, D_2 = 5889.965$
Mercury green	5460.73
“ yellow	5769.60 and 5790.65
Hydrogen	$H_\alpha 6562.784$
	$H_\beta 4861.327$

Photo-electric Work Function (electron volts).

Cesium	1.9	Sodium	2.46
Nickel	4.87	Tungsten	4.5
Platinum	6.3		

SOUND.

Velocity (metres sec.⁻¹).

Water (20° C.)	1484
Dry air (0° C.)	331.46
Glass	3500-6000
Iron	c. 5500

Frequency (cycles sec.⁻¹).

A 440, Top C 523.25, Middle C 261.625

MAGNETISM.

North Magnetic Pole	73° N., 100° W.
South Magnetic Pole	69° S., 144° E.
Earth's magnetic field at Abinger Magnetic Station, near Dorking, Surrey (1950):	
Declination	9° 20' W.
Inclination	66° 43'
Horizontal component	0.1863 oersted.
Vertical component	0.4329 oersted.

THERMAL CONSTANTS.

Substance	Melting Point (° C.)	Boiling Point (° C.)	Specific Heat (cal. g. ⁻¹ deg. ⁻¹)	Latent Heat of Fusion (cal. g. ⁻¹)	Latent Heat of Vaporisation (cal. g. ⁻¹)	Expansion Co-efficient (parts per million per deg.)	Thermal Conductivity (cal. cm. ⁻¹ sec. ⁻¹ deg. ⁻¹) at 0° C.
Alcohol .	-117	78.5	0.520 (20° C.)	—	205	1080	4.2×10^{-4}
Aluminium	660.1	2330	0.217 (20° C.)	96	—	23	0.57
Carbon .	Sublimes	4347	0.160 (11° C.)	—	—	5	0.0038
Copper .	1083	2582	0.093 (20° C.)	49	—	16.7	0.92
Gold .	1063	2660	0.031 (20° C.)	15	—	14	0.74
Helium	—	-268.9	—	—	6	—	—
Hydrogen .	-259.2	-252.8	6.0 (-253° C.)	—	108	—	—
Iron .	1535	2800	0.113 (20° C.)	64	—	11.7	0.182
Lead .	327.3	1750	0.0305 (20° C.)	6	—	29	0.084
Mercury .	-38.87	356.58	0.0333 (20° C.)	2.8	65	30-40	0.0215
Nitrogen .	-209.9	-195.8	0.028 (-200° C.)	6.1	47.7	—	—
Oxygen .	-218.8	-182.970	0.35 (-200° C.)	3.3	51	—	—
Silver	960.8	2193	0.056 (20° C.)	25	—	19	1.00
Sodium .	97.7	883	0.283 (0° C.)	27	—	62	0.322
Brass	ca. 950	—	ca. 0.089 (0° C.)	—	—	18-19	0.23-0.26
Glass	800-1000	—	0.12-0.16 (20° C.)	—	—	8-10	0.001-0.002
Steel	ca. 1400	—	ca. 0.107 (1000° C.)	—	—	c. 11	c. 0.11
Water	0.000	100.00	1.000 (15° C.)	79.7	540	210	0.001 (10° C.)

Absolute zero of temp. = -273.15° C.
 Mechanical equivalent of heat . . . = 4.1855 joule cal.⁻¹.
 Boltzmann's constant = 1.38042×10^{-16} erg deg.⁻¹.
 Stefan-Boltzmann constant . . . = 5.6687×10^{-8} erg sec.⁻¹ cm.⁻² deg.⁻⁴.
 Wien's constant = 0.28979 cm. deg.

ELECTRICITY.

Electrical Resistivity (microhm. cm. at 0° C.).

Constantan (or Eureka) .	48	Mercury .	94.077
Copper .	1.56	Platinum .	9.81
Nichrome .	103	Tungsten .	4.9

Electromotive Force (volts).

Daniell .	c. 1.1
Leclanché .	c. 1.5
Lead-acid accumulator .	c. 2.0
Weston Standard Cell (20° C.)	1.01858
Variation =	-40 μ V. per °C.

Electrochemical Equivalents (mg. coulomb⁻¹).

Copper .	0.3294	Oxygen .	0.0829
Hydrogen .	0.0105	Silver .	1.1180

ATOMIC PHYSICS.

Avogadro's number (phys.)	6.02472×10^{23} atoms mole ⁻¹ .
Loschmidt's number	2.68713×10^{19} atoms cm. ⁻³ atm. ⁻¹ at N.T.P.
Faraday constant of electrolysis (phys.) .	9652.0 e.m.u. (g. equiv.) ⁻¹ .
Charge of electron	4.80288×10^{-10} e.s.u. 1.60207×10^{-19} e.m.u.
Mass of electron	9.1085×10^{-28} g. ($\equiv 0.510984$ MeV.).
Ratio of charge to mass of electron . . .	5.2737×10^{17} e.s.u. g. ⁻¹ .
Planck's constant	6.6252×10^{-27} erg. sec.
Velocity of light	2.997929×10^{10} cm. sec. ⁻¹ .
Rydberg constant for hydrogen	109677.576 cm. ⁻¹ .
Mass of proton	$1836.12 \times$ mass of electron.
Mass of neutron	$1838.6 \times$ mass of electron.
Electron volt	1.60207×10^{-19} erg.
Atomic mass unit (phys.)	931.162 MeV.
For masses and lifetimes of Mesons and Hyperons see Arts.	

Radioactive Isotopes.

Isotope	Importance	Half Life	Radiations	
			β -(MeV.)	γ (MeV.)
C ¹⁴	Dating archaeological specimens, etc.	5570 years	0.155	—
Na ²⁴	Medicine	15 hrs.	1.39	1.37, 2.75
P ³²	General research	14.3 days	1.70	—
Co ⁶⁰	Medicine, industry	5.3 years	0.31	1.17, 1.33
Cr ⁵¹	Atomic bomb hazard, etc.	19.9 years	0.54	—
I ¹³¹	Medicine	8.1 days	0.61, etc.	0.08-0.72
Cs ¹³⁷	Medicine, industry	33 years	0.51, 1.17	(0.667)
Au ¹⁹⁸	Medicine	2.7 days	0.96, etc.	0.41, etc.

Some radioactive isotopes continually produce daughter isotopes that are themselves radioactive, emitting radiation different from that of the parent. These will therefore 'contaminate' the radiations quoted above.

MATHEMATICAL CONSTANTS.

$\pi = 3.1415927$	$e = 2.7182818$
$\log_{10} \pi = 0.4971499$	$\log_{10} e = 2.3025851$
1 radian = 57.29578°	
$1^\circ = 0.01745329$ radian	

Physical Geography, see PHYSIOGRAPHY.
Physical Geology is the branch of G. dealing with the forces affecting the surface of the earth, the processes which form and change the rocks making the crust and which mould the exterior of the earth. Throughout geological time the relief of the earth has been constantly changing. The energy required to bring about this change has been supplied by the sun and by the interior of the earth. The energy from the sun reaches the surface directly as radiant heat and as light. Indirectly heat from the sun affects the surface as a result of the circulation of the atmosphere and of the water on the earth which it promotes. Sunlight affects the crust in so far as it controls photosynthesis, and thus the distribution of plants and the composition of the atmosphere. Energy supplied from the interior of the earth causes movements of the crust and make possible uplift of mts and compression of parts of the crust; stresses applied during such movements produce earthquakes (q.v.) when the strain becomes greater than the rock can bear. Energy released usually as heat may alter or metamorphose rocks and bring about the formation of magma from which

igneous intrusions or volcanic rocks consolidate. The 2 groups of agents, the epigene or surface agents, such as the wind and the rain, and the hypogene or subsurface agents, such as earthquakes or igneous intrusion, act in the fields of gravity of the sun, the earth, and the moon, and in co-operation with the forces arising from the rotation of the earth around its axis and about the sun.

The prin. surface agents affecting the earth are the atmosphere, water and ice, and plant and animal life.

Temp. changes of the atmosphere bring about the decay or weathering of rock, a process accelerated by the chemical attack of the atmosphere. Winds transport and deposit sand and dust formed by weathering. Rain carries away or erodes weathered rock waste, gives rise to springs and rivs., recharges the ground-water and provides moisture, which returns at once to the atmosphere through evaporation. The rivs. erode, transport, and deposit material, building up great thicknesses of sediments in the sea where they discharge their loads of debris and fresh water. Where glaciers form they, too, erode, transport, and deposit new sediments.

The dominant processes at the earth's

surface are denudation and deposition; both tend to reduce the relief of the crust. In contrast, the changes induced by the subsurface agencies complete a cycle by accentuating the relief by raising mts, forming troughs or basins, and by warping the surfaces of continents or oceans.

Furthermore, the breakdown or weathering process taking place at the surfaces is the reverse of the recrystallisation produced by igneous action and metamorphism below the surface. Thus a fresh supply of new minerals and rocks arises through the alteration of the sediments formed by the denudation of the old.

The study of the land forms produced by these operations forms the field of Geomorphology. The geological record shows that comparable processes have operated in the past and that ancient deposits and landscapes can be accounted

delivered on the occasion of the presentation of Physical Society Awards.

The *Handbook of the Physical Society's Annual Exhibition of Scientific Instruments and Apparatus and Reports on Progress in Physics* are pub. each year. The society also publishes a monthly jour., the *Proceedings of the Physical Society*, containing original papers in all branches of physics.

The offices of the society are at 1 Lowther Gardens, Prince Consort Road, London, S.W.7.

Physical Society of Edinburgh, Royal, see ROYAL.

Physical Training, method of acquiring and maintaining bodily fitness. The belief that mental power and efficiency in action were related to physical well-being was prevalent among the ancient Greeks, but their example was not fol-



RAISED BEACHES, SPITSBERGEN

for by the agents at work to-day. This was first realised by Hutton and Lyell (qq.v.), who overthrew the catastrophic theory by demonstrating that the past could be understood in terms of forces acting at the present day. This is the doctrine of Uniformitarianism (q.v.), one of the fundamental tenets of geology.

Physical Society of London, incorporated body, founded in 1874, and with which the Optical Society was amalgamated in 1932. The object of the society is to promote the advancement and diffusion of a knowledge of physics. There are 4 specialist groups within the society, optical, colour, low-temp., and acoustics, membership of which is open to all interested in the subjects with which they deal, irrespective of membership of the society. Meetings are also arranged periodically on various subjects such as nuclear physics, electron physics, semiconductor, which are open to all members of the society, and special lectures are

lowed in the succeeding centuries except in so far as physical fitness was developed as part of military prowess. It was not until after the pub. of Rousseau's *Emile* in 1762 that the value of P. T. as part of normal education began to be recognised. This conception was developed by the Ger. pioneers, Johann Guts-Muths (1759-1839) and Friedrich Ludwig Jahn (1778-1852), while Friedrich Froebel (q.v.) influenced physical education by his insistence on the importance of play in the growth of the child. Jahn founded an organisation devoted to gymnastics, physical contests, and team games, called the Turnvereine. It was linked to the political resurgence of Prussia in the same way that the Sokol movement, which began in 1862, was linked to the patriotic aspirations of the Czech people. In Denmark P. T. became part of the normal school curriculum as early as 1814, and in the same year the Royal Central Institute of Gymnastics was opened in Stockholm by

Pehr Henrik Ling (1776-1839). Ling introduced a system of gymnastics, known as Swedish drill, which with the Ger. systems has been the basis of most P. T. since his day (see GYMNASICS; SWEDISH MOVEMENTS). Various modifications have been introduced, particularly in the direction of relating P. T. more to the natural and rhythmical movements of the human body. From Germany and Scandinavia the cult of P. T. spread to most European countries and to the U.S.A. It was at first linked mainly to military training or to remedial treatment for physical defects. Gradually, however, it came to be included in the normal school curriculum. The Amer. Physical Education Association was founded in 1885, and physical education became more and more popular in the U.S.A. from that date. In England, as a result of the preference for outdoor games, P. T. was not introduced into elementary schools until 1909. The value of P. T. is now undisputed, and it is recognised that the various systems are not mutually exclusive. Any course of P. T. must be directed according to the end in view. For instance, the system advocated by Eugene Sandow (q.v.) is primarily for muscular development, while the system of J. P. Müller is directed towards ensuring normal health and well-being. The value of P. T. lies in this possibility of obtaining controlled results, and combined with considerations of diet (see FOOD AND DIET) it forms an essential part of any specialised training, whether for military purposes or for sport (see TRAINING).

Physical Units. All measurements in scientific work are referred to the *fundamental* units of length, mass, and time. The *metre* is the unit of length on the metric system, and is the distance between 2 lines at 0°C. on a platinum-iridium bar called the International Prototype Metre, estab. in 1889, and kept at The International Bureau of Weights and Measures, in Sèvres, near Paris. The Brit. unit of length is the *foot*, one-third of the Imperial Standard Yard—the distance at 62°F. between the centres of 2 gold plugs in a standard bronze bar, estab. in 1856, and kept in the Standards Dept. of the Board of Trade, with copies in a few other places. Other units are derived from the metre (e.g. cm., mm., etc.) and foot (e.g. inch, etc.) (see METROLOGY). The United States yard is defined as 3600/3937 metre by an Act of Congress, 1866, and was accepted in 1893. The light-wave standard of length was defined in 1907, following careful measurements of the wavelength of the red line in the cadmium spectrum in terms of the metre. The unit is the International Ångström (Å), and is such that the wavelength of the red line of cadmium is 6438.4696 Å. It is almost exactly 10⁻⁷ cm. The *gramme* is the metric unit of mass, and is defined as one-thousandth part of the mass of the International Prototype Kilogramme of platinum-iridium (1889) kept at Sèvres. The Brit. unit of mass is the *pound avoirdupois*, and is the amount of matter contained in a

standard piece of platinum kept in London. Again there are the usual practical units, ounce, etc. The United States pound is defined as 0.4535924277 kg., and is almost exactly equal to the pound avoirdupois. The *Mean Solar Second* is the unit of time, and is defined as the eighty-six-thousand-four-hundredth part of the Mean Solar Day. There are sev. systems of units. The C.G.S. system is based on the centimetre, gramme, and second, and the units of other quantities are derived from them (see later). The M.K.S. system uses the metre, kilogramme, and second, and is claimed to have many practical and theoretical advantages, particularly in technical measurements. The F.P.S. system uses the foot, pound, and second, and has corresponding derived units for other quantities. Examples of derived units are: *Area*: sq. cm., etc. *Volume*: cubic cm., (cm.³) also ml., which is defined as one-thousandth of the volume of 1 kg. of pure water at its temp. of max. density (4°C.) under standard atmospheric pressure. 1 ml. = 1.000028 cm.³. *Density*: mass per unit volume, e.g. gm./c.c., or lb./cubic foot. *Force*: dyne (C.G.S.), poundal (F.P.S.). *Acceleration*: cm./sec./sec. or ft./sec./sec. *Energy*: foot-pounds (F.P.S.) or ergs (C.G.S.). 1 joule = 10⁷ ergs. *Power*: *Watt* (at the rate of 1 joule/sec.). 1 Horse-power = 33,000 ft.-lb./minute. *Heat*: the calorie (C.G.S.) or the Brit. Thermal Unit (B.Th.U.), i.e. the quantity required to warm 1 lb. of water through 1°F. 1 Therm. = 100,000 B.Th.U. of heat. 1 B.Th.U. of heat = 772 foot-pounds of work. There are 4 main systems in electrical work: *The Electromagnetic System* (E.M.U.), based on the definition: unit magnetic pole is such that when placed in a vacuum 1 cm. from an equal pole it is repelled by a force of 1 dyne. *The Electrostatic System* (E.S.U.), based on unit electrical charge which when placed 1 cm. from an equal charge in a vacuum, is repelled by a force of 1 dyne. For practical purposes these units are often inconvenient, and there are 2 systems of practical units. The M.K.S. system uses the metre, kg., and sec. with one electrical unit, e.g. ohm or amp. The International system, abandoned in 1948, was an arbitrary practical system based on definitions of the International amp and ohm which gave values nearly the same as multiples in integral powers of 10 of the E.M.U. The M.K.S. units are often almost exactly the same as the International system units. E.g.: *current*, ampere; *quantity*, coulomb; *potential difference*, volt; *resistance*, ohm; *energy*, kilowatt-hour or Board of Trade Unit; *capacity*, Faraday; *inductance*, Henry. *Dimensions* of any physical quantity can be given in terms of the fundamental units. Length (*L*), Mass (*M*), and Time (*T*). The dimensions of velocity are distance ————— time = $\frac{L}{T}$ or $L T^{-1}$, and of Force = mass × acceleration = $M \times \frac{L T^{-1}}{T} = M L T^{-2}$

See also METROLOGY; UNITS, ELECTRICAL; PHYSICAL CONSTANTS.

Physician (Greek *phusikos*, natural philosopher), one who having passed certain examinations is qualified to practise medicine as a profession (see MEDICAL PRACTITIONER).

Physicians, Royal College of, see ROYAL COLLEGE OF PHYSICIANS.

Physics may be defined broadly as the investigation of the properties of matter and energy. The definition is generally restricted to exclude those laws of matter and energy which are influenced by the presence of life (biology), and also those laws which take into consideration the molecular changes in matter (chemistry). The two branches, P. and chem., overlap a great deal, and it is very difficult to draw the line of demarcation between them. The subject matter of P. is subdivided into PROPERTIES OF MATTER, HEAT, LIGHT, SOUND, ELECTRICITY, MAGNETISM, and ATOMIC PHYSICS (q.v.). Reference may be made to the articles listed under these main headings. See also AETHER; COSMOLOGY; COSMOGONY; MICHELSON-MORLEY EXPERIMENT; PHYSICAL CONSTANTS; PHYSICAL UNITS; RELATIVITY; SPACE AND TIME.

While some branches of the subject were successfully studied in remote times and during the Middle Ages, the astonishing progress of modern times can be said to have begun about the time of Galileo (1564-1642) and Newton (1642-1727). In part, at least, this was due to a better appreciation of experimental method. This method involves the collection of data considered to be relevant to a given problem, followed by the formulation of a theory to correlate the data as far as possible, and the prediction of hitherto unobserved phenomena, which are then studied with a view to providing the basis for modifications of the theory, further predictions, and further experimentation. Galileo's work on mechanics was carried forward by Newton, whose genius enabled him to state certain generalisations which, until recently, appeared to epitomise the fundamentals of the whole subject, leaving to later generations little to be done except the working out of their consequences in particular cases. Newton also made important contributions to optics. He was, however, unable to accept the wave theory of light put forward by his contemporary Huygens (1629-95), as he could not reconcile it with the rectilinear propagation of light, and the weight of Newton's opinion doubtless retarded the further development of the wave theory. Nevertheless, evidence that light could be diffracted and could undergo interference continued to accumulate until by the end of the 19th cent. the wave theory appeared unassailable.

Knowledge regarding electricity and magnetism (which appeared to be isolated branches of physics) developed steadily during the same period, and a great advance was possible when near the end of the 18th cent. the discovery and development of voltaic cells made it possible to

generate steady currents instead of the minute charges which were all that could previously be obtained by friction. The work of Faraday (1791-1867) and others showed that magnetism and electricity were related, that currents were surrounded by magnetic fields, and that changing magnetic fields could generate currents. This led to modern methods of generating and using electricity. Moreover, Faraday's view that the energy of an electric charge is associated with a state of strain in the surrounding medium (the aether) was developed by Maxwell (1831-79) into the electromagnetic theory of light, a theory that not only linked the branches of light, electricity, and magnetism, but also pointed the way for the generation and use of wireless waves.

During the 19th cent. a mechanical theory of the nature of heat was accepted. It was estab., largely as a result of the researches of Joule (1818-89), that heat in a material was merely the kinetic energy of the particles (atoms and molecules) of which it was composed, and Joule was able to show that whenever heat was produced an equivalent amount of energy of another kind disappeared. Gradually there emerged the idea of the conservation of energy, i.e. that there is, in any system isolated from all other bodies, an amount of energy that, although it may change from one form to another, yet always remains constant in amount. The law of the conservation of energy soon became a fundamental part of physics, and the kinetic theory, when applied to gases, led to simple results and explained the nature of their changes when pressure and temp. are altered.

By the end of the 19th cent. P. appeared as a unified whole, and, on a superficial view at least, physical theories seemed capable of explaining most natural phenomena. It appeared almost as though the main outlines of the subject had been filled in, and that only details remained to be added. Such a view, however, proved entirely illusory, and in the upshot neither the concepts of atoms and the all-pervading ether as then understood nor the laws of mechanics proved satisfactory. According to classical theories, the earth moved through a stationary ether, and it would be possible by refined experiments to measure its speed relative to the ether. The Michelson-Morley experiment (q.v.), although sufficiently sensitive, revealed no trace of such movement, and led in 1905 to Einstein's theory of relativity. Among other consequences of this theory, Newton's laws of motion, although highly satisfactory approximations in most circumstances, are shown not to be fundamental, but to be merely instances of more general laws. Moreover, the theory shows that the law of conservation of energy requires modification in that mass must also be regarded as energy; if mass disappears energy must be released in other forms and in enormous amounts. The second big change of view results from the discovery by J. J. Thomson in 1896 of the electron, whose

mass was shown to be only a small fraction of that of the lightest atom; this discovery not only demonstrated that the atoms are not the ultimate particles of which matter is composed, but led also to the electrical theory of the atoms themselves. Further, it opened the way for the practical use of the electrons in such applications as radio and television, in photo-electricity and X-rays. A third and no less fundamental change was due to the quantum theory (q.v.). Propounded first by Planck in 1900, in an attempt to explain certain laws of radiation, this theory has proved to be the key to the understanding of a great number of atomic phenomena. It has revealed not only that light and radiation partake of the properties of both particles and wave motion, but that matter itself has a similar dual nature (see WAVE MECHANICS).

The discovery in 1932 of the neutron and the positron was followed by a rapid development of the understanding of nuclear phenomena. Important consequences of this work, which sprang from the study of radioactivity, were the atomic bomb and the peaceful applications of nuclear power. The theory of the nucleus is still far from satisfactory, and must find a place for the mesons and hyperons first discovered in the cosmic radiation.

See A. S. Eddington, *Nature of the Physical World*, 1935; P. W. Bridgman, *Logic of Modern Physics*, 1938; L. de Broglie, *Matter and Light: the New Physics*, 1939; H. E. White, *Classical and Modern Physics*, 1940, and *Modern College Physics*, 1956; P. A. Schilpp, *Einstein, Philosopher-Scientist*, 1949; S. T. Glasstone, *Sourcebook on Atomic Energy*, 1950; A. D'Abro, *Evolution of Scientific Thought from Newton to Einstein*, 1950; M. Born, *The Restless Universe*, 1951; G. Joos, *Theoretical Physics*, 1951; *Dictionary of Physics and Electronics*; R. Kronig (ed.), *Textbook of Physics*, 1954; F. W. Sears and M. W. Zemansky, *University Physics*, 1955; F. K. Richtmeyer, E. H. Kennard, and T. Lauritsen, *Introduction to Modern Physics*, 1955; G. O. Jones, J. Rotblat, and G. J. Whitrow, *Atoms and the Universe*, 1956.

Physics, Institute of, founded in 1918 for the advancement and diffusion of a knowledge of pure and applied physics and for the elevation of the profession of physicist, concerns itself particularly with the application of physics in industry. The Institute grants the Diplomas of F.Inst.P. to Fellows and A.Inst.P. to Associates in order to secure authoritative recognition of the holders as physicists. The Institute also has the grade of Graduate (Grad.Inst.P.), and there is a grade for Students. The Institute conducts its own examination for the grades of Fellow, Associate, and Graduate. There is also a grade for Subscribers. Specialist subject groups covering electronics, electron microscopy, non-destructive testing, industrial spectroscopy, stress analysis, X-ray analysis, and education are sponsored.

The Institute publishes 2 monthly journals, the *Journal of Scientific Instruments* and the *British Journal of Applied Physics*, two series of monographs, *Physics in Industry* and *Monographs for Students*, and a number of special pamphlets. Papers are printed or summarised in one of the Institute's journals or the monthly *Bulletin*. The London H.Q. are at 47 Belgrave Square, S.W.1.

Physiocratie School, name given to a group of Fr. economists and philosophers of the 18th cent. Their name was at first 'économistes,' but the name 'physiocrates' (Greek *phusis*, nature, and *kratein*, to rule) was given to them by P. S. Dupont de Nemours, one of their number. Their main doctrine was the superiority of nature to all man's work and the excellence of her eternal and immutable laws; thus they held that all commerce was sterile, and the only fruitful labour was agriculture. The money necessary to carry on the affairs of the community they proposed to raise by a single land tax, whilst their ideal of gov. was a despotism in which the ruler himself obeyed the laws and principles of nature. Their head was François Quesnay, and their chief practical exponent was Turgot. The physiocrats, whose principles were largely drawn from R. Condillon, never had a large following, as their tenets did not attract the multitude. They were, however, sincere, and Turgot used his power in attempting to liberate the industry of France and better the condition of labour. See H. Higgs, *The Physiocrats*, 1897.

Physiognomy, external appearance of the body and particularly the face, its features and expression, from which we are accustomed to draw conclusions as to character. Many attempts have been made to place it on a scientific basis and to render it useful as an art, and with some very slight success in anthropology and criminology. Della Porta (*Humana physiognomonica*, 1586), Campanella, Cardan, and Lavater (*Fragmente*, 1775-8) gave great attention to the subject. Darwin's *Expressions of the Emotions in Man and Animals*, 1873, and Mantegazza's *Physiognomy and Expression*, 1890, were the first works of any scientific value. Piderit, in *Mimik und Physiognomik*, 1886, pays special attention to muscular expression. Physiognomic indications of pathological conditions are, of course, valuable. Phrenology (q.v.) attempts to deduce character from 'bumps' on the skull.

Physiography, or **Physical Geography**, description of nature; as originated by Huxley and defined by H. R. Mill, it describes the substance, form, arrangement, and changes of all the real things of nature in their relations to each other, giving prominence to comprehensive principles rather than to isolated facts. It aims at a general appreciation of the earth and universe in every aspect as shown in everyday phenomena, with the aid of the sciences of astronomy, geology, biology, physics, chem., geography, and meteorology. It cannot strictly be termed a science, being rather a collection from

other sciences of those facts which relate to the earth, especially as it exists at the present day. See T. H. Huxley, *Physiography. An Introduction to the Study of Nature*, 1878.

Physiologist, see **BESTIARY**.

Physiology, that branch of the science of biology which is concerned with the functioning, as opposed to the structure, of living beings. For a sketch of its history, development, and scope, see **BIOLOGY**. For special branches see **LONGEVITY**; **REPRODUCTION**; **ANIMALS**; **DEATH**; **DIGESTION**; **BLOOD**; **BILE**; **RESPIRATION**; and for plant P., see **PLANTS**.

Physiotherapy, healing by means of physical agents. The methods employed in P. include not only massage (q.v.) but also aerotherapeutics, balneology, electrotherapy, heliotherapy, and treatment by ultra-violet and infra-red light, which are dealt with separately under these headings. A very important section of P. consists of the rehabilitation of organs whose functioning has been impaired by accident (e.g. war injuries) or by disease (e.g. poliomyelitis, 'infantile paralysis') (see **OCCUPATIONAL THERAPY**). The training of a physiotherapist commences with the study of anatomy, physiology, and pathology, and is followed by clinical instruction in special schools attached to hospitals. The prin. examining body for physiotherapists is the Chartered Society of Physiotherapy, which keeps a register of those who have qualified for membership by its examination. The society was granted a royal charter in 1920. Since then 21,117 persons have become chartered physiotherapists, and of this number 15,257 are still on the society's verified register, although all of them are not in active practice. The H.Q. of the Chartered Society of Physiotherapists is at Tavistock House (North), Tavistock Square, London, W.C.1.

Physostigma, or **Pysostigma**, see **CALABAR BEAN**.

Phytosaurs, group of crocodile-like thecodont reptiles which were abundant in late Triassic times.

PI, Gk letter π , used as a symbol to denote the ratio of the circumference of a circle (q.v.) to its diameter: 3.14159 approximately. Although this ratio can be found roughly by actual measurement, it can be determined to any degree of accuracy from first principles. The symbol was first used, 1706, by William Jones (q.v.). The transcendence of π was proved, 1882, by F. Lindemann.

It has been shown in Differential Calculus (q.v.), that $\frac{d}{dx} \tan^{-1} x = \frac{1}{1+x^2}$, an expanding $(1+x^2)^{-1}$ by the binomial theorem, we obtain $1 - x^2 + x^4 - x^6 + x^8 - \dots$. Now assume $\tan^{-1} x = A + Bx + Cx^3 + Dx^5 + Ex^7 + Fx^9 + Gx^{11} + \dots$, then $\frac{d}{dx} \tan^{-1} x = B + 3Cx^2 + 5Ex^4 + 7Fx^6 + 9Gx^8 + \dots$, and equating the coefficients of like powers of x in the two above series, each of which $= \frac{d}{dx} \tan^{-1} x$, we have $B=1, C=0, D=-\frac{1}{3},$

$E=0, F=1, G=0, H=-\frac{1}{5},$ etc., and hence $\tan^{-1} x = x - x^3/3 + x^5/5 - x^7/7 + x^9/9$

... This series converges for all values of x less than 1, and the smaller x is, the more rapidly does it converge.

From the formula for $\tan (\theta + \phi)$ under Trigonometry (q.v.), making $\theta = \phi$, $\tan 2\theta = 2 \tan \theta / (1 - \tan^2 \theta)$, and this formula will be used with that just derived to determine the value of π .

Let $\tan \theta = t$, and $\tan 2\theta = T$, then the last formula gives $T = 2t / (1 - t^2)$, from which $T^2 + 2t - T = 0$. Solving this quadratic in t , it is seen that $t = \frac{-1 \pm \sqrt{1+T^2}}{T}$,

and hence if we know the value of the tangent of an angle, the value of the tangent of half the angle is easily computed from the above expression. Instead of taking the tangent from trigonometrical tables, this will be computed from elementary geometrical principles as follows. Draw a right-angled isosceles triangle; obviously each acute angle is 45° , and from the definitions given in Trigonometry, $\tan 45^\circ = 1$, because it is the ratio of one side of the triangle to another equal side. From the above solution of the quadratic, making $T=1$, it is found that t , the tangent of 22.5° , is $(-1 \pm \sqrt{1+1}) = (-1 \pm \sqrt{2})$. Using the positive value before the radicle, this reduces to $t = 0.41421356$. This value of $\tan 22.5^\circ$, that is, of $\tan \pi/8$, since $180^\circ = \pi$ radians (see **RADIANS**), could be used to find π , but as the series would converge rather slowly, it will be better to find the value of $\tan 11.25^\circ$, that is, of $\tan \pi/16$. This is done by substituting for T the value found for $\tan 22.5^\circ$, that is, 0.41421357. In these circumstances, $t = (-1 \pm \sqrt{1+0.17157287}) / 0.41421357$, and this is easily found to reduce to $t = 0.19891236$. The series for $\tan^{-1} x$ will now be used, making $x = 0.19891236$, and the following are the values of the powers of x that are required:

x	0.19891236	x	0.19891236
x^2	0.00787019	$\frac{1}{x}$	-0.00262340
x^3	0.00031139	$\frac{1}{x^2}$	0.00006228
x^4	0.00001232	$\frac{1}{x^3}$	-0.00000176
x^5	0.00000049	$\frac{1}{x^4}$	0.00000005
Algebraic sum			0.19634953

Hence $\pi/16 = 0.19634952$, or $\pi = 3.141592$.

Pia Mater, see **BRAIN**.

Piacenza: 1. Prov. of Italy, in NW. Emilia-Romagna (q.v.). It is mainly in the Apennines (q.v.), except for a broad plain in the N., which is watered by the Po (q.v.). Tribs. of the Po form valleys running SW.-NE. The prin. tns include P., Castel San Giovanni, and Bobbio (qq.v.). Area 1020 sq. m. Pop. 299,000. (anc. Piasentia), lt. city, cap. of the prov. of P., on the r. b. of the Po, 88 m. NW. of Bologna (q.v.). In 219 bc, P. is mentioned as a Rom. colony; 20 years later it was sacked by the Gauls (see **GALLIA**). In 1545 it was united with Parma (see **PARMA**, **DUCHY OF**). Here in 1746, during the War of the Austrian

Succession (see AUSTRIA, History), the Austrians defeated a Franco-Sp. army. The tw was in Fr. hands in 1796 and in 1800-14. During the Second World War there was considerable damage. P. is regularly laid out, and has many historic buildings, including sev. palaces. The 12th-cent. cathedral, in Lombard-Romanesque style, has curious and grotesque internal decorations. Among the other medieval churches in the tn that of Sant'Antonino, the foundation of which goes back to AD 324, is notable. The 16th-cent. Farnese (q.v.) castle is now a museum. There is a trade in agric. produce, and manufs. of brass and iron goods, and silk. Pop. 76,000.

Piankhi (d. 714 BC), Ethiopian king of Nepata. The expedition which led to his conquest of Egypt is described on a granite stele, now in Cairo. P. is also the name of sev. other kings of the same race and ter.

Pianoforte, keyboard instrument commonly said to have been invented by Cristofori at Florence in the early 18th cent., which differed from its predecessors in that its strings were struck by hammers, making possible pronounced gradations of tone, hence the derivation of its name from an early description, *col piano e forte*.

Though plucked string tone can be traced back to the lyre of the anc. Greeks and to still more remote E. sources, only those instruments with a keyboard need be taken into account as direct forerunners of the modern P. The most familiar are the clavichord, virginal, spinet, and harpsichord (qq.v.), all of them possessing certain common, as well as some distinguishing, features. On the sensitive clavichord, dating from the early 15th cent., the stretched strings were touched by tiny tangents which remained in contact with them as long as the fingers remained on the keys. A slight oscillation of the finger could produce a suggestion of vibrato, and very small tonal gradations were also possible. In shape it resembled a miniature grand piano, without legs. The virginal and spinet both appeared in the early 16th cent., and the gentle but slightly more metallic tone of each was produced by plectra or quills, which on the depression of the keys plucked the stretched strings. Because of the plectra, the spinet's name may have been derived from the It. *spina* (thorn), though possibly it was called after a Venetian instrument-maker, Spinetti. The virginal, belonging to England, may have been so named because it was the favourite instrument of Elizabeth I, the virgin queen, or because it was popular amongst young ladies. Both were small portable instruments, though the spinet often had its own legs. More robust in tone was the larger harpsichord, frequently shaped like a small grand piano with legs, which also appeared in the 16th cent. Again the strings were plucked, but the harpsichord often had 2 keyboards, one controlling hard and the other soft quills to produce 2 grades of tone, which could not be varied by

pressure from the player's fingers. In time certain stops were added, bringing other quills into action for tonal effects.

However, Bartolomeo Cristofori (1655-1731), harpsichord-maker in the service of Prince Ferdinand de' Medici and his father, the Grand Duke of Tuscany, Cosimo III, after refining many instruments of the older type, eventually created one with a single keyboard capable of a wide range of tone produced not by mechanical means such as stops, but by the player's fingers; the more swiftly the key was depressed, the louder the tone, and vice versa. This he achieved by substituting hammers for plectra (hence the Ger. name *Hammerklavier*), possibly suggested to him by the old dulcimer, on which the player held a hammer in each hand, and though the harpsichord with its plucked tone survived alongside the P. throughout the 18th cent., the infinitely greater and more natural eloquence in tone of the new instrument came to be valued by all the romantic composers from Beethoven onwards, and Mozart had already recognised it. By 1711 Cristofori had completed a P. with a hammer, hopper, and damper, and an improved model of 1726 also included a check to prevent the hammer from rebounding. Within a few years of Cristofori's new invention, a Frenchman named Marius and a German, Christoph Gottlieb Schroeter, were at work on similar productions, but as Marius produced his at least 5 years after Cristofori and Schroeter not until after 1717, the Italian's priority is not seriously endangered by claims on their behalf.

After his death, however, the great improvements that followed in details of the action, tone quality, and quantity, and extension of the compass, came more from Germany, England, and later France and America, than from Italy. In Germany Silbermann's later pianos and Zumpe's smaller square pianos enjoyed considerable popularity, the latter not least in England. This square piano is thought to have been invented by the organ-builder C. E. Frederici of Gera, some time in the early 18th cent.; it must not be confused with the upright 'cottage' piano (with strings ranged vertically instead of horizontally as formerly in the upright clavichord, known as the clavitherium), which appeared a century later. In England, thanks to the devotion of such manufacturers as Stodart and the Broadwood family, this company temporarily took the lead. In 1783 John Broadwood patented sustaining and soft pedals; in 1808 James Broadwood introduced metal bracings to reinforce the older wooden frames as the thickness of the strings and their tension was increased. Stodart's firm, however, produced the first complete metal frame in 1820. Other firms notably concerned in the instrument's evolution include those of Erard and Pleyel of Paris, and Steinway of New York.

A consideration of the normal action to-day shows that the key is simply a lever for raising the hammer, which is lifted to the string by a jointed piece of

into 40 paras. It is coined in 1-, 2-, 5-, 10-, and 20-P. pieces (all silver), and 100 P.s go to the pound. Half-P., $\frac{1}{2}$ -P., and $\frac{1}{4}$ -P. pieces are of nickel. By decree of 1916 the monetary unit of Egypt is the gold Egyptian pound of 100 P.s. Coins in circulation include 20-, 10-, 5-, and 2-P. pieces in silver; 1-, $\frac{1}{2}$ -, $\frac{1}{4}$ -, $\frac{1}{8}$ -P. pieces in nickel; $\frac{1}{16}$ - and $\frac{1}{32}$ -P. pieces in bronze. In Cyprus 180 P.s or 20 shillings go to the pound. Current silver coins are 3-, 4 $\frac{1}{2}$ -, 9-, 18-, and 45-P. pieces; bronze and nickel, 1, $\frac{1}{2}$, and $\frac{1}{4}$ Cyprus P.s. See METROLOGY.

Piatigorsk, see PYATIGORSK.

Piatra Neamt, tn of Moldavia, Rumania, on the Bistrita, at the base of the Carpathians, 60 m. WSW. of Jassy. It trades in lumber. Pop. (1930) 30,000.

Piaui, state of Brazil, bounded on the N. and NW. by the Atlantic and the state of Maranhão. The surface is mainly tableland, and is excellent for cattle grazing. The prin. riv. is the Parnaíba. The chief products are grain, cotton, rice, rubber, dye-woods, tobacco, vegetable oils, and sugar, while iron, copper, lead, salt, and silver are found. Cap., Teresina. Area 96,262 sq. m. Pop. 1,045,696.

Plave, Battle of the. The R. P. is in N. Italy; rising in Austria, it flows S. to the Carnatic Alps, thence SE., entering the gulf of Venice 10 m. above Venice. In the First World War the Austrian offensive during Oct.-Nov. 1917 drove the Italians westward on to the line of the P. from the Central Alps to its mouth, and desultory fighting continued until the middle of June 1918, when the Austrians decided to turn the whole of the It. front on the P. by a break-through in the mt area, supported by a frontal attack from Montello to the sea. The Brit. contingent was stationed about Montello under Gen. Plumer, who was succeeded in Mar. 1918 by Lord Cavan. The Austrians were at first partially successful, but heavy floods broke down their bridges, disorganising communications and commissariat, and a general withdrawal was ordered. In Oct. 1918 Gen. Diaz decided upon offensive action in this area, and the Brit. forces took over more frontage for the operations. The offensive opened on the night of 26 Oct. On the 27th Lord Cavan crossed the P., and on the same day the Austrians made an offer of peace. On 3 Nov. they agreed to Gen. Diaz's terms for an armistice. See ITALIAN FRONT, FIRST WORLD WAR CAMPAIGN ON; WORLD WAR, FIRST.

Piazza (It.), formal space surrounded by buildings in any It. tn, corresponding to an Eng. 'square' or a Fr. *place*.

Piazza Armerina, tn in Sicily (q.v.), nearly 2500 ft above sea-level, 14 m. SSE. of Enna (q.v.). It has a 17th-cent. cathedral, a Norman church, and an anc. castle. There is a woollen industry and a trade in wine and olive oil. Pop. 38,000.

Pibroch (Gaelic *piobaireachd*, pipe-tune), classical form of Scottish Highland bagpipe music, consisting of intricate variations on a single theme or *urlar*. The tunes of *Ceol Mor* or Big Music can-

not be played on any other instrument and are mainly martial laments and commemorative pieces; the *Ceol Meadhonach* or Middle Music includes songs and ballads; and the *Ceol Beag* or Little Music consists of marches and reels. Competitions are organised by the Piobaireachd Society. See also BAGPIPE.

Plo du Midi, see MIDI-DE-BIGORRE, PLO DU.

Pica, see PIKA.

Pica, printing type equivalent in the point system to 12 point. See TYPE AND TYPE-SETTING.

Pica, craving for unnatural food, such as chalk, especially in pregnancy. It is a symptom found in some forms of insanity and hysteria.

Picard, Jean (1620-82), Fr. astronomer, b. La Flèche (Sarthe). He succeeded Gassendi as prof. of astronomy in the Collège Royal de France (1655), and was one of those selected by Colbert to originate the Academy of Sciences (1666). In 1667 P. made his first application of the telescope to the measurement of angles, and discovered a new system of astronomical observation with the pendulum. He measured the arc of the meridian of Paris between Amiens and Malvoisine (1669), which he described in *Mesure de la terre*, 1617, and showed that earlier measurements must have been 15 per cent in error.

Picardy, anct. prov. of France, comprised of the modern dept of Somme, and parts of the depts of Pas-de-Calais, Aisne, and Oise. It came finally under the Fr. crown in 1477. The cap. was Amiens.

Picardy, Battle of (1918), see FRANCE AND FLANDERS, FIRST WORLD WAR CAMPAIGNS IN (1918), *Battle of Picardy*.

Picaresque Novel, or *novela picaresca*, name of popular origin given to a type of novel which describes the adventures of a *pícaro*. This Sp. word, meaning 'rogue,' has been naturalised into Eng. as 'pícaroon,' and first appears in the writings of Capt. John Smith (1579-1631). The vogue for novels descriptive of low life and centring on a rascally hero began in Spain with the pub. in 1554 of Hurtado's *Vida de Lazarillo de Tormes*. This book is the autobiography of a rascal who becomes successively the servant of a blind beggar, of a priest, of a miserly *hidalgo*, and so on. It was enormously successful, and Hurtado's example was followed by Mateo Aleman, who wrote *Atalaya de la vida humana*, a title which was changed to *El pícaro Guzman de Alfarache* by the public with whom it was so popular. A sequel was pub. at Brussels in 1604, while in 1618 appeared another masterpiece of this genre, *Relaciones de la vida y aventuras del Escudero Marcos de Obregon*, by Vincente Espinel. In Spanish these romances of roguery were called *Gusto Picaresco*, meaning the Picaresque School. The vogue of the P. N. lasted for over 50 years, but declined towards the middle of the 17th cent. The Sp. P. N. had a direct influence on the Fr. writer Le Sage, who in his *Le Diable boiteux*, 1707, imitated Guevara's *El Diablo cojuelo*, 1641; and

in his still more celebrated *Gil Blas*, 1715, borrowed largely from Espinel's *Marcos de Obregon*, from which indeed he took his prologue, numerous incidents and features, and even the character of Sangrati (Sagredo in Espinel).

In England there existed a 16th-cent. trans. of Hurtado's *Lazarillo de Tormes*, which went through sev. eds., and in 1594 Nash's *Unfortunate Traveller* introduced the P. N. as a native of Eng. literature. In the 18th cent. low life and the manners of rogues were the very stuff of the Eng.

Picariæ, picarian birds, an order of Carinatae, comprising sev. sub-orders, most of which are inhab. of the tropics. They are the guacharos (*steatornithes*), the Madagascar rollers (*leptosomati*), the humming-birds (*trochili*), the frog-mouths (*podargi*), the colles (*coliti*), the hornbills (*bucerotes*), and the mots-mots (*momoti*). All these sub-orders have the same characteristics, and contain, as a rule, but few species, which represent the various sub-orders in the tropics of both the Old and New World. All the picarians differ from



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'LA LECTURE'

Oil painting by Picasso.

novel in the hands of Defoe (*Moll Flanders*, *Colonel Jack*), Fielding (*Jonathan Wild*), and above all Smollet (*Roderick Random*, *Peregrine Pickle*, *Humphry Clinker*). J. B. Priestley's *The Good Companions*, 1929, is a 20th-cent. example of the Picaresque style. The old P. N., apart from its literary interest, has a sociological value as a picture of the life and customs of all classes of society. See articles on separate authors; R. Salillas, *El Delincuente español*, 1896, and Hampa (*Antropología picaresca*), 1898; F. W. Chandler, *Romances of Roguery*, 1899; Fonger De Hann, *An Outline of the History of the Novela Picaresca in Spain*, 1903.

the passerine birds in the arrangement of the tendons of the foot, the *flexor perforans digitorum* being connected with the hal-lux. Nearly all picarian birds possess one common osteological character, a double notch in the hinder margin of the sternum. As a rule they lay white or at least uniform pale-coloured eggs, which are always hidden from sight in the hole of a tree, or under the shelter of a building or rock.

Picasso, Pablo Ruiz (1881-), Sp. painter, b. Malaga. His father was a drawing-master surnamed Ruiz, whose wife's maiden name, P., was assumed by their son. He began to paint very early (at La Ceruna) and fraternised with the

artists of Barcelona Academy. He first arrived in Paris in 1900, and took up permanent residence there in 1903. At the beginning his work was influenced by the traditions of Degas and Toulouse-Lautrec, but between 1901 and 1904 he turned to austere figure studies, blue being the dominant colour. Circus pictures followed, delicate and more varied in colour. After the 'blue' and 'rose' periods, 1907-9, P. and a fellow artist Georges Braque (q.v.) developed 'Cubism' from the study of Cézanne combined with that of primitive art. This formula has had great influence on the course of painting, and P. himself adhered to it until 1914. After the First World War he reverted to more classical painting, and designed the décor of a number of ballets, but shortly before and after the Second World War his painting, always the subject of much controversy, became extremely violent, causing vehement criticism. The most notable example of this phase is P.'s 'Guernica', painted in 1937 during the Spanish civil war. His later work (as in the practice of combining two different views of a head in the same 'double image') has its Surrealistic aspect, but P. goes freely from one style to another, and uses various media with the same amazing liberty. He has practised sculpture, illustrated books (e.g. Buffon, 1942), in 1946 began to design pottery at Villauris, near Antibes; from Nov. 1953 to Feb. 1954 produced 180 drawings on the theme of artist and model. No later artist of the School of Paris has superseded him in international influence. His paintings are in leading European galleries and at the Museum of Modern Art, New York; he is also represented in many private collections. See A. H. Barr, *Picasso: Fifty Years of his Art*, 1947; D. Sutton, *Picasso: Blue and Pink Periods*, 1949; J. Sabartes, *Picasso: an Intimate Portrait*, 1949, and (with W. Boeck) *Picasso*, 1955.

Picathartes, genus of Picarthartinae which is a sub-family of the Sturnidae (starling) and embraces two closely allied species, *P. gymnocephalus* or Guinea bare-headed rock-fowl, and *P. oreas*, or Cameroon bare-headed rock-fowl. It was not until 1938 that the true relationship of the 2 birds was recognised, for previously the genus *P.* had been placed by systematists in the Corvidae, and the birds were erroneously referred to in literature as bald-headed crows, as has been shown by Dr P. R. Lowe. The 2 species are remarkable in appearance, both having the entire head and nape bare of feathers. In *P. gymnocephalus* the crown and skin on the fore part of the face are bright yellow, with the hinder part black; in *P. oreas* the pattern is reversed, the fore-crown leaden blue, the hind-crown carmine red. The skin of the hind-neck is bright yellow in the first, carmine in the second, and very scantily feathered in each case. The general colour of the plumage in both is grey above and white below. The bill is long and fairly straight and powerful, and decidedly crow-like, and the wings are short and rounded. The legs

are strikingly developed, and the feet are furnished with strong decurved claws suitable for scratching in the ground and for the bird's characteristic long, springing hops. *P.* is about the size of a crow. It feeds on insects, snails, crabs, frogs, and beetles, and builds remarkable mud-nests, which it plasters on rocks. Its very restricted W. African distribution and its habitat among the rocks in forested country at high elevations explain why so few Europeans have ever seen it. Cecil Webb, curator-collector to the Zoological Society of London, in Sept. 1948, brought back from the Cameroons a specimen of *P. oreas*, the first instance of *P.* to be seen alive in captivity. More recently the Zoological Society's Expedition to British Guiana (1955) has brought back individuals of the New World species. See D. A. Bannerman, *The Birds of Tropical West Africa*, vol. vi, 1948.

Piccadilly: 1. Famous London thoroughfare, running between P. Circus and the S.E. corner of Hyde Park. It appears that the name was given, perhaps jocularly, in the early 17th cent. to the house built in the vicinity by a retired tailor, who had derived part of his living from the sale of pickadills, i.e. the edgings of ruffs, etc. *P.* was much developed and became fashionable in the late 17th cent. In *P.* are St James's Church (designed by Wren), Burlington House (Royal Academy of Arts), the Ritz and Piccadilly hotels, and many high-class shops. In P. Circus, at its E. end, is a fountain with a statue (popularly, but mistakenly called 'Eros') in memory of the 7th Earl of Shaftesbury (q.v.). See also BOND STREET.

2. One of the prin. thoroughfares in the centre of the city of Manchester.

Piccard, Auguste (1884-), Swiss physicist, b. Lutry. Prof. of physics at the Confederate Technical High School in 1917, and in 1922-54 at Brussels. He gained fame through his stratosphere flights with a free balloon and air-tight gondola. In some of these flights he was assisted by his twin brother Jean Félix, who carried out research in organic chemistry. In 1931, from Augsburg, he reached a height (with his assistant Kipfer) of 51,775 ft and in 1932, from Zürich, 55,577 ft. In 1947 he designed a 10-ton diving bell or 'bathyscaphe' for deep-sea exploration on similar principles, and descended 3150 metres in 1953. He pub. *Between Earth and Sky* (trans. by C. Apcher, 1949); *En bathyscaphe au fond des mers*, 1954; *In Balloon and Bathyscaphe*, 1956.

Piccinni, Niccolò (1728-1800), It. composer, b. Bari, studied at Naples under Leo and Durante, and in 1754 produced his first opera at the Teatro Fiorentino there. He was very successful, and in 1760 took Rome by storm with *La Cechina*, ossia *La buona figliuola*, based on Richardson's *Pamela*, which long held the stage as perhaps the most favoured It. opera of its kind. In 1776 he was invited to Paris, and his first Fr. opera, *Roland*, was produced there in 1778. He was now pitted against Gluck by partisans who

liked to have something to quarrel about, and the feud between the Gluckists and Piccinnists, in which the composers themselves took no part, reached its height when in 1781 P. set the libretto of *Iphigénie en Tauride*, which had already been used by Gluck. The Revolution drove P. back to Naples, and his last years were made miserable by neglect and poverty. Back in Paris in 1798, he found some relief, but other troubles came and he had a stroke. He died at Passy on 7 May 1800. He wrote over 120 operas, using many of Metastasio's libretti and also that of *Atys* previously set by Lully.

Piccolo (It., abbreviation for *flauto piccolo*, meaning little flute). The small octave flute, more usually called *ottavino* in Italian, similar in shape and technique to the ordinary flute, but smaller in size and standing an octave higher in pitch. It transposes up an octave, its music being written an octave below the actual sound.

Piccolomini, Aeneas (Aeneas) Sylvius, see PIUS (popes), *Pius II.*

Piccolomini, Francesco Tedeschini, see PIUS (popes), *Pius III.*

Picenum, div. of ant. Italy, lying along the Adriatic coast, and bounded on the W. by the Sabine lands and Umbria. The people of the country became subject

2. Outermost troops of an outpost line who are not expected to offer serious resistance to the enemy so much as to give warning of his approach. In the 18th cent. when two opposing forces in the field were in loose contact P.s were used to mark the limit of ground occupied by each side, and would be posted in the open in full view of the enemy P. line without either side attempting to molest the other. The word has been borrowed for the vocabulary of industrial dispute (see PICKETING).

Picketing, prevention of 'blacklegging' in strikes by stationary persons outside the entrances to factories or workshops. Under the old Conspiracy and Protection of Property Act, 1875, P. was illegal in so far as compulsion was used by the pickets; but in 1906 an amending Act excluded 'peaceful' P. from the operation of the old Act. Again, the Trades Disputes Act, 1927, passed after the general strike of 1926, provided that P. was illegal if committed in respect of a strike which had been declared unlawful, as was the general strike, by virtue of a decision given in the chancery div. The Trades Union Congress pressed frequently for the repeal of the Act of 1927, and on coming to power in 1945 the Labour Gov. repealed it in full.



PICCOLO

Boosey & Hawkes, Ltd.

to the Romans in the 3rd cent. BC, but rebelled in 90 BC, subsequently submitting to Rome after their defeat. In the 8th cent. AD Pepin handed P. to the Pope.

Pichloago, see CHLAMYDOPHORUS.

Pichincha: 1. Volcano of the W. Andes in Ecuador, 8 m. NW. of Quito. It has sev. peaks, the highest being 15,423 ft, while its crater is extremely deep. It has not been in eruption since 1660. Its slopes were the scene of a battle in 1822 when Sucre triumphed over the Spaniards and estab. the independence of Ecuador.

2. Prov. in NW. Ecuador; volcanic ter. subject to earthquakes, though possessing much fertile land. Quito is the cap. Area 6347 sq. m. Pop. 426,897.

Pickering, mkt. tn in the N. Riding of Yorkshire, England, 25 m. NE. of York, known as the 'Gateway to the Yorkshire Moors.' It is an old tn, having a church dating from the 14th cent. and a castle in which Richard II was imprisoned. There is trade in agric. produce, and agric. instruments are made. Pop. 4300. See G. Home, *The Evolution of an English Town*, 1906.

Picket, military term, meaning: 1 Detachment of regimental details or military police who patrol a tn to enforce the keeping of bounds, or who remain in barracks for the purpose of guarding against fire or who constitute an unarmed guard on stables, waggon lines, etc.

Pickford, Mary (stage name of Gladys Mary Smith) (1893-), film actress, b. Toronto. She first appeared on the stage in 1898 as the child Cleo Denver in *The Silver King*. In 1912 she made her first appearance as a cinema actress—for the Biograph Company, under David W. Griffith, in *The Violin-maker of Cremona*. Others of her films were *Stella Marie*, *Rebecca of Sunnybrook Farm*, *Madame Butterfly*, *Daddy Long-legs*, *Dorothy Vernon of Haddon Hall*, and *Little Lord Fauntleroy*; but her appearances in sound films were less successful. She organised the United Artists Corporation with Charles Chaplin, Douglas Fairbanks, and D. W. Griffith in 1919, and later became head of her own film company. She married 3 times: (1) Owen Moore (marriage dissolved); (2) Douglas Fairbanks (marriage dissolved); (3) Charles Rogers. She pub. *Why not try God?*, 1934, *My Rendezvous with Life*, 1935, and *Sunshine and Shadow*, 1956.

Pickling (metallurgy). The term 'acid-pickling' denotes the removal of scale, oxide, or rust from metals so as to restore their chemically clean surfaces. These various processes may be applied to stock, to work at intermediate states of fabrication, or to finished components. Stock is available as sheet, rod, bar, tubing, etc., the surfaces of which become oxidised during manuf., either by hot rolling or drawing operations. Scale must be re-

moved before drawing or rolling operations to prevent it from being forced into the metal, with consequent defects. The P. action in some cases is purely chemical dissolution of an oxide or carbonate in the acid of the pickle; in others it may be a mechanical removal of the scale by virtue of action between base metal and acid. Prior to acid P., work must be freed from grease by an alkali or some other solvent; otherwise the oil or grease reduces the effectiveness of the acid P. solution and also causes irregular removal of the scale. After acid P., thorough water washing is necessary to remove traces of acid, otherwise corrosion will occur.

Pickling of Fruit, see PRESERVING.

Pico, is. of the Azores (q.v.), lava-covered, and having a volcano just over 7600 ft high. Wine is the chief product. The chief tn is Madalena. Area 167 sq. m.; pop. 22,350.

Pico della Mirandola, Giovanni, Count (1463-94), It. philosopher and writer, b. Mirandola, the youngest son of Francesco P., prince of Mirandola. After spending 7 years in various univ. cities of Europe, he proposed (1486) a disputation at Rome on 900 subtleties of philosophy. The Pope forbade the debate, whereupon P. defended his orthodoxy in an *Apologia*, and in 1493 Alexander VI absolved him of the charge of heresy. P. also wrote *Heptaplus* (1481), a mystical exposition of the creation. His works also include *De Ente et Uno*, an attempt to combine the teachings of Plato and Aristotle, and a treatise against astrology. He led a wandering life, was a generous almsgiver, and a friend of Politian, Ficinus, and Lorenzo de' Medici. *See* lives by St Thomas Moro (Tudor Library ed., 1890), 1510; H. Walter, 1933; and L. Gautier Vignal, 1937; also A. Schill, *Giovanni Pico della Mirandola und die Entdeckung Amerikas*, 1929, and P. Kibre, *The Library of Pico della Mirandola*, 1936.

Picotee, variety of carnation (q.v.) in which the plain coloured petals are edged with a second colour.

Piquet, see PIQUET.

Picric Acid (Gk pikros, bitter), trinitrophenol, $C_6H_3(NO_2)_3OH$, is formed when nitric acid is heated with wool, silk, leather, etc. It is prepared by acting on phenol with sulphuric and nitric acids, and is obtained as a yellow crystalline solid (melting point 122.5°) which is soluble in hot water. P. A. has been used as a high explosive and as a dye. Many of its salts, particularly its lead salt, explode violently on percussion, and for this reason lead-free conditions are prescribed for its manuf. P. A. is of interest as one of the few organic acids that do not contain the carboxyl group, $-COOH$. *See* LYDITE; EXPLOSIVES.

Pierite, pyroxene rock, usually serpentinised with olivine, magnetite, hornblende, etc. P.s. are a subdivision of the ultrabasic igneous rocks, viz. the peridotites.

Potatium, see POITIERS.

Pictography, or Picture-writing, the most primitive stage of true writing (q.v.).

A picture or sketch, termed 'pictograph,' represents the thing shown. A sketch of a man would indicate 'man'; the pictograph of an animal would represent that animal, a circle might represent the sun. Straight narrative can be thus recorded in a sequence of pictographs, but such pictures could not say enough. Therefore the pictographs also became ideographs: the pictures not only representing the things they showed, but also the underlying ideas associated with those things; a circle, for instance, might represent the 'day.' P. is found everywhere, among ancient peoples of Egypt, Mesopotamia, Crete, Central America, China, etc., as well as among modern tribes of N. America, Africa, and Asia.

Pictou, Sir Thomas (1758-1815), soldier, b. Poyston, Pembrokeshire. He entered the Army in 1771, became major in 1795, and took an active part in the capture of St Lucia in the following year. When Trinidad was taken from the Spanish in 1797 P. was put in charge of the administration as a military dictator, his 5 years' tenure of office being characterised by arbitrary conduct but undoubted ability in maintaining order. He was criticised for applying harsh Sp. laws in the punishment of natives, and he got into trouble with the Privy Council for permitting a kind of Sp. inquisitorial tribunal to be set up for the suppression of *obé*, or sorcery. Yet he was a most popular governor, feared but loved, and he administered Trinidad so successfully that the inhab. presented him with a golden sword when they petitioned against the retrocession of the is. to Spain. He was present at the siege of Flushing (1809), and appointed governor of the tn. He served in the Peninsular War under Wellington, and greatly distinguished himself on many occasions, notably at Badajoz and Vittoria. P. commanded a div. at Quatre Bras, and was shot while leading a charge at Waterloo. *See* H. W. Robinson, *Memoirs of Sir Thomas Pictou*, 1836, and a description of his stormy career in Trinidad in E. L. Joseph's *History of Trinidad*, 1837.

Ploton, cap. of Prince Edward co., Ontario, Canada, 40 m. SW. of Kingston. It is important for its foundries, shipyards, and agric. products, especially fruit. Pop. 4590.

Pictor, Fabius, see FARIA GENS.

Pictor, one of Lacaille's S. constellations, situated S. of Columba, containing Kapteyn's star, magnitude 9.2, proper motion 8.70", and distance 12 light-years. Its proper motion (q.v.) is greater than that of any star except Barnard's star (*see* BARNARD). Its distance is about twice that of Barnard's star, and its actual transversal speed is greater than that of Barnard's star.

Pictou, port of entry and cap. of P. co., Nova Scotia, Canada, 84 m. NE. of Halifax, in a fertile dist., with extensive coal mines, and steel mills. P. Academy was opened in 1818. Coal, lumber, fish, fresh and canned lobster are exported, ships are built and repaired, and there is a foundry.

P. is Nova Scotia's best N. port for the Gulf of Lawrence and overseas trade. Pop. 4260.

Picts, people inhabiting Scotland, part of the N. of Ireland, and perhaps portions of France, notably Poitou, from early times. Few archaeologists would admit that the Picts have any definite place or status in prehistory, though some attempt has been made to connect them with the southern-builders (q.v.). They are first named in AD 297, and are described by early Rom. authors as a definite nation. Arrian says that they were *nec falso nomine Pictos* (not falsely named P.), a statement which has led to the assumption that they received their national appellation because they were either painted or tattooed. Claudian, a court poet, writing c. AD 400, alludes to the 'iron-marks' on the body of the dying Pict, but whether the people took their name from the fact that they were painted is conjectural. According to some scholars, however, the name is a Lat. trans. of the Celtic-Welsh *pryd*, 'shape,' external appearance. The Latin-speaking Britons used the term P. to describe the barbarians beyond the N. frontier. By the end of the 3rd cent. it was the accepted name of the inhab. of central and N. Scotland, and adopted nationally by the Caledonians. Time and again during the Rom. occupation the P. harried Romano-Brit. ter., and to secure the safety of the prov. the Romans erected at different periods the great frontiers of the Antonine Wall and Hadrian's Wall, across the narrower portions of Scotland. These structures were in some degree instrumental in repressing Pictish invasion so long as they were adequately and consistently manned, but on the departure of Rom. forces from the Is. the P. once more invaded Brit. ter., penetrating on this occasion as far as London, and making tremendous havoc. Gildas and Nennius, authors of c. AD 670 and c. AD 800, and Bede (c. 673-733) are the later authorities on the hist. of the P. The hist. of the P. subsequent to the Rom. withdrawal relates chiefly to constant domestic broils caused mainly by the peculiar circumstances which attended the Pictish law of succession, or, as it has been called, the law of tanistry, in which succession was vested in the eldest and most worthy of the same blood and, therefore, not necessarily according to the principle of primogeniture. Soon after the landing of the Scots in Pictish ter. they became involved in war with the P., and incessant hostilities, covering a period of at least 3 centuries, concluded only with the union of the 2 peoples under the sway of Kenneth Macalpine, a Pict on his mother's side. A long list of kings, mythical for the most part, is afforded by the *Pictish Chronicle*, which also notices current events in a very perfunctory manner. After the union of the 2 peoples there is little doubt that they fused insensibly into one stock, and that the P. form part of the ethnic make-up of the present Scottish people. As late as the 12th cent.

persons alluded to as P. are to be found in the cartulary of Glasgow cathedral, and at the battle of the Standard in 1138 the vanguard of the Scottish army was composed of P. from Galloway. Indeed, Pictish seems to have been spoken in Galloway as late as the beginning of the 17th cent. Very little is known about the ethnic and linguistic affinities of the P., though much has been surmised on little or no real evidence. They are considered by some scholars as early Celts, by others as the pre-Celtic aborigines of Scotland. The Caledonians, who gave the Rom. name to the country, were one of the main Pictish tribes. Sev. ogham inscriptions, mainly found in NE. Scotland and in the N. Isles, are written in a variety of ogham (q.v.) known as Pictish ogham. They have not yet been satisfactorily trans. One famous word given by Bede, *Peanfahel* or *Bennal*, is said to signify the 'head of the wall,' alluding, of course, to one of the ramparts which retarded the S. progress of the P. Many antiquities ascribed locally to the P. are scattered over the face of Scotland; they are in fact monuments of many periods.

Picts' Wall, an old-fashioned name for Hadrian's Wall (q.v.).

'Picture Post', illustrated weekly jour. founded in 1938 by Edward Hulton. P. P. set a new standard of pictorial journalism, and was soon estab. as Britain's leading picture weekly, giving impartial coverage to social and international problems. In 1956 a quicker production schedule enabled P. P. to become the first picture weekly to present headline news in pictures. It ceased publication in June 1957.

Picture Restoring, see RESTORATION.

Picture Telegraphy, see TELEGRAPHY.

Picture-writing, see PICTOGRAPHY.

Pidgin, or **Pigeon**, English (Chinese corruption of the Eng. word 'business'), mixed jargon much in use in the Chinese ports as a means of communication between the natives and European traders. It consists of English, with Chinese, Malay, Hindustani, and Portuguese, and is constructed according to Chinese idioms.

Piece of Eight, see EIGHT, PIECE OF.

Piecework, system of payment of wages by results as opposed to payment by time-earnings. For many trades the latter is, generally speaking, the only form that could be applied, since they are not adapted to measurement of output, nor would they be easily able to carry a general or overhead bonus based on efficiency. The simplest and oldest form of payment by results is individual P.; group P. is an extension of this; gang P. prevails in jobs which need the close co-operation of sev. individuals; overhead P., based frequently on the normal output of the work as a whole, provides that, in whatever proportion it may be exceeded, in the same proportion the aggregate wages of the workers will be increased. To encourage 'P. speed' on work which does not lend itself to measurement by the 'piece' there are various local systems,

which include 'guarantee rates' or 'New rates,' mostly additions to ordinary time-rates, sometimes the survival of a local custom, or induced by the pressure of exceptional conditions of work. Much more complex in many respects are the bonus schemes which have direct reference to output; for value both of output and sales is liable to fluctuations in the sphere of distribution not under the control of wage-earning producers. P. is normally most effective where the work is standardised and the output easily measurable. Objections to P. systems have been made on the grounds that they foster jealousy and rivalry among workers; that piece-rates undermine standard time-rates, that earnings on P. are variable and precarious, upset family budgets, create inequality of wages between individual and individual, and group and group, and serve to emphasise to the employer differences in capacity or industry; and also that they conduce to undue speeding up, exhaustion of the worker, and to a shorter working life owing to premature decline of physical and mental energy on account of the increased strain. It is sometimes contended that systems of remuneration based on results involve a departure from the principle of collective bargaining. Employers and trade unions, however, deny these objections generally and maintain that in so far as they may be valid the remedy lies not in the abandonment but in the perfecting of the system. See further under WAGES.

Pieck, Wilhelm (1876-), Ger. politician. He left the Social Democratic party in 1918 to become a Communist, being a member of the Reichstag 1928-33. Subsequently he lived in the U.S.S.R. After the Second World War he played a prominent part in helping the Russians to establish a Communist regime in the Soviet zone of Germany, and became first president of the German Democratic Republic in 1949.

Piedmont (It. *Piemonte*), region (*compartimento*) of NW. Italy, comprising the provs. of Alessandria, Asti, Cuneo, Novara, Turin, and Verceil (q.v.). It is bounded N. by Switzerland, NW. by Valle d'Aosta, W. by France, S. by Liguria, and E. by Lombardy (q.v.). It is largely in the Alps (q.v.), and contains the W. part of the Po (q.v.) basin. Its soil is fertile, producing olives, vines, wheat, maize, rice, chestnuts, and fruit. Coal, lead, copper, silver, nickel, and salt are mined. The chief tin is Turin. The region was once a principality belonging to the House of Savoy (q.v.). Area 9800 sq. m. Pop. 3,602,000.

Piedras Negras, tn of Coahuila prov., Mexico, 850 m. from Mexico city, on the Rio Grande, opposite Eagle Pass (Texas). It is a port of entry to NE. Mexico; in the vicinity are coal, silver, copper, and zinc mines. It is also a cattle-raising centre, and cattle and horse mtrks are held. It was temporarily renamed Porfirio Diaz under that dictator. Pop. 15,660.

Piel (originally Fowdry), is, and harbour of the Furness Peninsula, Lancs,

England. Here Lambert Stimmel landed in 1487. The is. is notable for the ruins of P. Castle. Pop. 3.

Piemonte, see **PIEDMONT**.

Plenliang, see **KAIFENG**.

Pie-poudre, Court of (*curia pedis pulverizati*), in England, was formerly held at fairs or markets to administer ready justice to buyers and sellers, and has now fallen into disuse. It was so called from O.F. *pied poudre*, 'dusty foot.' It is mentioned in the O.E. law books as the court *pepoudrous*, meaning that justice was administered 'while the dust fell from the feet.' Courts *pepoudrous* were 'incident to every fair and market because that for contracts and injuries done concerning the fair or market there shall be speedy justice done for advancement of trade and traffic.' The necessity for this speediness for certain classes of people was recognised as far back as Bracton in the 13th cent. The records of these courts are necessarily few, and, as a consequence, 'there is no part of the history of English law more obscure than that connected with the maxim that the Law Merchant (q.v.) is part of the law of the land' (Blackburn). But the Selden Society discovered the abbot's roll of the fair of St Ives, 1275-91, containing a series of cases which show how the merchants administered the law merchant in the courts of the fair, and why such cases did not come into the king's court. In most seaports there was a similar court dealing with cases arising out of ships. Thus any ship coming into the port of Ipswich with a dispute about its Bill of Lading might get summary justice at once from the 'pepoudrous' court at Ipswich between tide and tide (Black Book of Admiralty, Rolls Series, II. 23).

Pier, in architecture, support or pillar for an arch, bridge, or beam; also a rectangular narrow projection on a wall to give additional support to a beam or other load. A P. template is a stone cover on a brick P. to distribute the load over the whole section. A P. is essentially a structural member as distinct from a 'plaster' (q.v.), which is often merely of decorative value. Also a breakwater or jetty built out into the sea, serving to form a harbour, a landing-place, or a marine promenade. See also **BREAKWATER**.

Pierce, or **Peirce**, Benjamin (1809-80), Amer. mathematician and astronomer, b. Salem, Massachusetts. He was educ. at Harvard Univ. and studied under Bowditch, author of *The Practical Navigator*. On the death of Bowditch in 1838 P. became the leading Amer. mathematician. The first works that made his name more widely known were his computation of the general perturbations of Uranus and Neptune, and his researches into the equilibrium of Saturn's ring, in which he showed that a fluid ring was unstable as well as a solid one. His chief mathematical works were *System of Analytical Mechanics* and *Linear Associative Algebra*.

Pierce, Franklin (1804-69), fourteenth president of the U.S.A., b. Hillsborough,

New Hampshire. He served in the House of Representatives (1833-7) and in the Senate (1837-42). He fought in the Mexican war (1846-7), and was elected President in 1852. His objection to the abolition of slavery was the chief cause of his subsequent withdrawal from political life. *See* lives by N. Hawthorne, 1852; J. R. Irelan, 1888, and R. F. Nichols, 1931; also Anna E. Carol, *Review of Pierce's Administration*, 1856, and W. R. Leech, *Calendar of the Papers of Franklin Pierce*, 1917.

Pieris, a genus of evergreen shrubs or trees, family Ericaceae, related to Rhododendron; *P. floribunda*, *P. formosa*, *P. japonica*, and varieties are popular garden shrubs with hly-of-the-valley-like flowers; requiring lime-free soil.

Pierlot, Hubert (1883-), Belgian politician, b. Cugnion, and educ. at Louvain Univ. A member of the Social Christian party, he was minister of the interior (1934-5), minister of agriculture (1936-8), Prime Minister (1939). In 1940 he assumed also the office of foreign minister, and after the capitulation of King Leopold became head of the Belgian Gov. in exile in London. After Belgium was liberated P. headed a gov. from Sept. 1944 to Feb. 1945. He was minister of state until 1954.

Pierné, Gabriel (1863-1937), Fr. conductor and composer, b. Metz, studied at the Paris Conservatoire, where he won the Prix de Rome in 1882. In 1890 he succeeded Franck as organist at Sainte-Clotilde, in 1903 became second conductor of the Colonne concerts, and on the death of Colonne in 1910 took full charge of them. He wrote 8 operas, *Vendée* (1897) being the most remarkable, 10 ballets, incidental music for plays, cantatas, concertos, orchestral and chamber music, piano and organ pieces, and songs.

Piero della Francesca (c. 1416-92), It. painter, b. Borgo San Sepolcro, Tuscany; also called **Pietro Borghese**. He preferred to be known by the name Francesca, in recognition of his widowed mother's devotion. P. was the pupil of Domenico Veneziano (q.v.) and is famous as a painter in fresco. He visited Rome, where he painted frescoes in the Vatican for Nicholas V. These were immense works, and were reproduced in the Vatican library. They were, however, in poor condition as early as the 16th cent., when Raphael was commissioned to replace them with his masterpieces. There is therefore somewhat slender evidence of the merit of this work. Vasari states that P. did work in an Augustinian chapel, but this no longer exists, and his most famous fresco works are those in S. Francesco of Arezzo, slightly damaged during the Second World War, at Borgo San Sepolcro, and the 'Flagellation of Christ' in Urbino Cathedral. The 'Resurrection of Christ,' an oil-painting found in an old Augustine convent at Arezzo, is in the style of Perugino. Tiraboschi, commenting on one of his Arezzo frescoes, the 'Dream of Constantine,' praised it for its effects of light and shade, special knowledge of the

play of muscles, and magnificence of drapery. Modern appreciation has steadily grown for the artist's consummate science in pictorial construction and power as a colourist: both being superbly exemplified in the 2 great treasures of the National Gallery, the 'Nativity' and 'Baptism of Christ.' The education of Bramante as a painter is generally ascribed to P., whose work, like that of the latter, is regarded as having some affinity to the school of Padua. P. is also celebrated for revealing an advanced knowledge of perspective. He seems to have lost his sight at the age of 60, after which he employed himself in abstract speculation. *See* lives by C. Ricci, 1910; H. Graber, 1920; A. Venturi, 1922; and R. Longhi, 1927; monograph by Sir K. Clark, 1951; also A. Stokes, *Art and Science*, 1949.

Piero di Cosimo, *see* COSIMO.

Pierre, Jacques Henri Bernardin de Saint, *see* BERNARDIN DE SAINT-PIERRE.

Pierre, cap. of S. Dakota, U.S.A., and also of Hughes co., on the Missouri R. and the Chicago and NW. Railroad, 110 m. W. of Huron. It is a trade and distribution centre for a farming and ranching area, producing livestock, corn, wheat, and barley. There are railroad shops and an airport, and beverages are manufactured. There is also a gov. Indian industrial school. Pop. 5715.

Pierre de la Ramée, *see* RAMUS, PETER.

Piers Plowman, *see* LANGLAND, WILLIAM.

Pierson (originally **Pearson**), **Henry Hugh**, or **Heinrich Hugo** (1815-73), composer, b. Oxford. He was educ. at Harrow and Cambridge, studied music with Attwood and Corfe, and interrupted a medical course to continue musical studies at Leipzig, where he met Mendelssohn, Schumann, and others. He became Reid prof. of music at Edinburgh in 1844 in succession to Bishop, but soon resigned and returned to Germany, where he remained and changed the spelling of his name. He produced music for the second part of Goethe's *Faust*, 1854, the operas *Leila*, 1848, and *Contarini*, 1872, the oratorio *Jerusalem*, 1852, and numerous smaller works.

Pietas Julia, *see* PULA.

Pieter de Hondt (later **St Peter Canisius**) (1521-97), Jesuit theologian, b. Nijmegen, Holland. He became a Jesuit in 1543 and founded the first house of the Society in Germany, at Cologne. He became the first provincial of the Society in Germany (1556). The re-establishment of Rom. Catholicism in Germany was due largely to his zeal. His catechism, *Summa Doctrinarum*, was authorised in 1566. He was canonised and declared a doctor of the Church in 1925.

Pietermaritzburg, seat of gov. and cap. of Natal (q.v.), S. Africa, 56 m. NW. of Durban (q.v.); founded by the Boers in 1839, and called after two of their leaders, Piet Retief and Gert Maritz. Retief and Maritz were voortrekker leaders who crossed the Drakensberg in 1838 into Natal. Retief was murdered, together with his followers, by Dingaan, the Zulu

chief. Later Andries Pretorius made a vow that if God gave his men victory they would build a church and set apart one day every year to commemorate it. The sequel was the decisive victory of the battle of Blood R., whence the Church of the Vow, built in old Cape Dutch style and opened for worship in 1840. It was subsequently acquired for the nation and is now a museum for *voortrekker* relics. A Brit. regiment garrisoned the tn in 1856, when Natal was made a separate colony by royal charter. The first legislative council of Natal met in P. the next day, and thus the tn became the cap. of Natal. Few buildings of the P. of a century ago are to be seen to-day, and the old Raadzaal or House of Parliament, built closely on the lines of the Church of the Vow, was demolished and the present city hall built on the site. The city hall was rebuilt and reopened in 1901, the original hall having been destroyed by fire in 1898. The city has broad streets and is built on a sloping plain (altitude 2218 ft.) and is noted for its healthy climate. Pietermaritz and Retief Streets perpetuate the names of the 2 pioneers; other pioneers are commemorated in the street names of Burger, Boshoff, and Greyling. P. is the seat of an Anglican bishop, and is the home of the univ. of Natal; it has also many schools and colleges. There is an art gallery, library, hospital, and the Natal Museum, the latter being notable for its collection of big-game animals and economic insects. P. has a large tanning extract factory capable of processing 40,000 tons of wattle bark annually, with an ann. extract production of 12,000 tons. Here also is one of the largest shoe factories in the S. hemisphere. Other industries include bricks and roofing tiles, chocolates, cream, dairy utensils, machines for crushing maize, and biscuits. The botanic gardens were estab. in 1874. Flowers and shrubs from all over the world are gathered in these gardens, which stretch over 100 ac. There are also parks and a natural bird sanctuary. P. is set in a countryside of lakes and streams and waterfalls. In the vicinity are Howick on the Umgeni R., with golf course and tennis courts; the Karkloof Falls and the Umhaas Falls, all popular camping places. Pop.: Whites, 32,100; Bantu, 28,806; Asiatics, 16,050; Coloureds, 3433. See L. Trichardt, *Trek across the Drakensberg* (ed. C. Fuller), 1837-8; M. Nathan, *The Voortrekkers*, 1937; H. G. McKean, *Cradle Days of Natal*, 1930; and A. F. Hattersley, *Pietermaritzburg Panorama*, 1938.

Pietersburg, chief tn and administrative unit of the N. Transvaal, S. Africa, near the source of the R. Sand. Copper, tin, antimony, and corundum are worked in the vicinity, and P. is the centre for gold-fields. Pop.: Whites, 7644; Bantu, 11,785; Coloured, 692; Asiatics, 239.

Pietists, adherents of a 17th cent. movement in the Lutheran Church against what they considered cold dogma devoid of religious feeling and practical piety. Without leaving the Lutheran Church, the

P. instituted meetings called 'Collegia Pietatis,' whence their name. Philipp Jakob Spener was chief promoter of these meetings, which began about 1670. The movement produced some interesting literature. Pietism was not an isolated movement, but can be linked with similar tendencies in other countries.

Pietro in Vaticano, San, see **St PETER'S**.
Pieve Di Cadore, lt. vil. in Veneto (q.v.), on the Piave. It is the centre of the Cadore, a mountainous region in the Alps, N. of Belluno (q.v.). The dist. saw much fighting during the First World War (see **PIAVE, BATTLE OF**). Titian (q.v.) was b. here. Pop. (vil.) 1000; (com.) 4300.

Pieve Santo Stefano, It. tn in the prov. of Arezzo, on the Tiber (Tevere) R. It has some interesting buildings, including the Collegiate Church, which, after the fighting of 1944, stood untouched and almost alone among the ruins. The tn. was systematically destroyed by the Gers. Pop. 1400.

Piezoelectric Effect, see **QUARTZ CRYSTAL**.

Piezometer, instrument for measuring the compressibility of liquids. The simplest form consists of a strong glass cylinder, the top of which is fixed to a metal cap. This cylinder is filled with water. Inside the vessel a long glass bulb terminating in a capillary tube is filled with the liquid to be experimented upon, the end of the capillary tube dipping beneath the surface of some mercury. The volumes of the bulb and the capillary tube are known. Pressure is applied to the surface of the water; this forces the mercury into the capillary tube, thus subjecting the liquid to a pressure which is measured by means of a manometer. By observing the compression, the compressibility per unit of pressure can be calculated. The contraction in this case is not totally due to that of the liquid, but the volume of the glass vessel also contracts, and thus a correction has to be made, which Reynaud eliminated by a new form of P.

Pig. The wild boar (*Sus scrofa*) survived in Britain until the 18th cent., and is still to be found in parts of Europe. It is from crosses between its tamed representatives and the Neapolitan and Chinese P.s that the valuable Brit. breeds of domesticated P.s originated. The domestication of the P. began at a very remote period in China, but it is only in recent years that special attention has been devoted in all parts of the world to the breeding of animals that satisfy the demand for very prolific sows and perfect pork- and bacon-making 'machines.' All the best European and Amer. breeds owe their present quality to the introduction of blood from Brit. stock. Modern Brit. breeds have attained their present conformation and qualities as the result of careful breeding and selection during the past 70 years. The founding of the National Pig Breeders' Association in 1884 and individual breed societies at subsequent dates have done much to determine the value of the pedigree P. trade as a national asset. With

meal. Given enough minerals and vitamins, the key to balanced rations lies in the protein : carbohydrate or nutritive ratio. The heavier the P., the more protein needed. At 50 lb. a P. needs 0.3 lb. protein daily, at 75 lb. 0.4 lb., at 100 lb. 0.5 lb., and at 150 lb. or more 0.6 lb. The chief protein-rich foods are fish meal, meat meal, bean and pea meal, dried blood, dried yeast, soya-bean meal, decorticated ground-nut meal, and separated milk. The chief carbohydrate-rich foods are barley meal, flaked maize, maize meal, maize germ meal, weatings, wholewheat meal, tapioca meal, potatoes, bran, middlings, ground oats, brewers' grains, and sugar-beet pulp. The last 5 are considered somewhat inferior, owing to high fibre content, and should not bulk too largely in the rations.

The actual composition of a 'feed' will depend first upon the age and purpose of the P.s, and then upon the foods available and their price according to season and supplies. A popular tested ration for a sow is 10 per cent fish meal, 45 per cent barley meal, and 45 per cent weatings. In varying this or any other ration, other foods of similar feeding values should be chosen to replace part or all of one of the prescribed ingredients. Roots and green foods may supplement a reduced meal ration, though their chief contribution is to the health of the P.s. Swill consisting of kitchen waste is a major P. food during war-time and under shortages. Untreated or raw swill must, by law, be steamed or boiled for at least 1 hr.; 3½ lb. swill replaces 1 lb. of P. meal in a ration. It is most suitable for P.s of 50 lb. or more, and should have cereal meal added to a suitable consistency. Prepared concentrated swill (Tottenham pudding) is offered by certain local authorities. P.s may be fed: (1) dry meal, with water provided separately; (2) dry meal with water poured on to it; (3) meal soaked and fed wet from buckets. Care is needed in (1) and (2) if meal is not to be wasted. The simplest feeding is with balanced rations in cubed form, the higher cost being offset by the labour saved.

Housing. P.s are naturally clean animals. Given good housing they will not soil their bedding, but usually void in a corner of their shelter or run. Dry, weatherproof quarters, free from damp and draughts, are essential for thrifty growth and good health. Outdoor housing is suitable for all types and ages of P.s, but fattening P.s are usually housed indoors, where warmth and restricted exercise encourage fattening more quickly. P.-houses should face S., unless flanking a central feeding alley, when the pens should run N. and S. Out of doors access to grazing means some economy in feeding, but damage to pastures. Buildings should be movable, and designed to give a dry bed and protection from draughts and sun. A floor area of 9 ft by 6 ft is desirable. Sectional wooden huts on runners or wheels or triangular P. arks are suitable for tethered sows with litters and weaner P.s. Feeding troughs are separate.

Such buildings can be made into fold units by fencing runs, but need moving frequently. True fold units consisting of house with run and built-in feeder, and water trough, are made of wood and constructed to be moved at intervals of not more than 3 days. They are suitable for boars, expectant sows, sows and litters, and weaner P.s up to 100 lb. live weight. Outdoor shelters may be improvised from straw bales, thatched hurdles, and straw-stuffed wire, but are temporary expedients at best. **Indoor housing** may consist of one or more sties with runs attached, adapted farm buildings with or without an open or covered yard, or blocks of individual sties with central feeding alleys of the Dan. or Scandinavian type. Sties may be built of wood, pressure-cresoted, brick, or hollow concrete blocks. For sows and litters a sleeping compartment and a run, each 8 ft square, are the minimum; for fattening P.s the dimensions should be 12 ft by 6 ft. Floors must be warm and dry. Wooden floors are warmest but not durable. Concrete floors are suitable if insulated from the cold and damp of the earth. Provision of a farrowing rail is helpful for sows. A built-in feeding trough with a swinging shutter is an advantage. On the farm open or covered yards can be adapted by dividing with straw bales or straw-stuffed wire-netting walls. Loose boxes and dis-used stables can also be converted. The central feeding or Scandinavian type of P.-house consists of 2 or more ranges of pens under one roof with central feeding passage and dung passages. Careful design is needed to avoid draughts and faulty ventilation. Floors must be insulated from the earth and outer walls constructed of 'warm' materials. Air-conditioning has been found advantageous. Important measurements are: pens 8 ft 6 in. by 12 ft, dung passages 3 ft 6 in., and feeding passage 6 ft; each pen to hold 10 P.s. Detailed plans are contained in Bulletin No. 32 on *Pig-keeping* (Ministry of Agriculture and Fisheries).

Diseases. Swine fever is a virus disease which is contagious and most serious. Its occurrence is compulsorily notifiable. Sick P.s, usually young, lose appetite, vomit, shiver, suffer great thirst, and tend to eat filth and bedding instead of food. A purple rash may appear on ears and belly; death occurs most often at 15 days. Non-infected P.s in contact with the outbreak can be protected by the injection of serum. The best preventive is inoculation of all P.s with crystal violet vaccine, under the Ministry of Agriculture registered vaccinated herd scheme. Foot-and-mouth disease, another virus infection, may affect P.s and is notifiable by law. Infected P.s go off food, have high temps., become lame, slaver at the mouth, and blister inside the mouth and sometimes on the skin. Swine erysipelas is not notifiable. It causes a high temp., loss of appetite, and a patchy dark red or violet rash may appear on chest, back, neck, and thighs. Acute infection causes death in a few days. Mild cases may recover or

become chronic. Serum and antibiotic injections cure most cases. Ann. vaccination may also be used as a preventive. Mange, a scabby condition of the skin, is treated by the application of modern parasitocides such as B.H.C. (Gamexane). P.s. are subject to sev. parasites. The round intestinal worm is common, also the lung worm. A hair-like spiral worm, *Trichina spiralis*, encysts in P.s. and is communicable to man in insufficiently cooked pork, ham, or bacon. The armed tape worm of man (*Taenia solium*) is transmitted by 'measley pork' (*Cysticercus cellulosae*). Fortunately trichinosis is rare and 'measley pork' non-existent in Great Britain. Cleanliness in the sties and frequent change of run, if out of doors, are important preventives. Lice may be eradicated by dressing with linseed or mineral or motor oil, or modern parasitocides (B.H.C., etc.).

Economics of Pig-keeping. Expenditure must be recovered largely from sale of P.s. Straw, foods, etc., come from outside sources. An economical unit comprises 30 sows and their progeny and 2 boars, manageable by one man and an apprentice or boy. A herd of half in-P, gilts and half younger gilts, with some pedigree animals for future breeding, gives a sound starting stock. The minimum housing would be 16 or 17 farrowing sties, a feeding house for weaned P.s. and houses for the boars and growing gilts. Initial capital costs are high. A working capital of roughly one-third that of the initial outlay will also be required to carry through the first year. Food comprises 75-78 per cent of production costs, labour 12-15 per cent, leaving 10 per cent to cover sundries. Depreciation of buildings may be charged at 10 per cent per year, while breeding stock depreciates by about 20 per cent in the case of sows and 30 per cent in the case of boars annually.

Home Pig-keeping. The usual practice is to buy a P. at 6 weeks after weaning for fattening for bacon or pork. To produce a pork P. of 120 lb. live weight requires 3 cwt. of meal and takes about 3 months; a bacon pig of 200 lb. live weight requires 6 cwt. of meal and takes about 6 months. Economies in feeding can be made by using kitchen waste. Apart from the wide range of food products yielded by a P., there is the fertilising value of its manure for the land.

See Ministry of Agriculture, *Pig-keeping* (Bulletin No. 32); *Home Curing of Bacon and Hams* (Leaflet No. 127) and *Farm Buildings* (Post-war Studies No. 17); *The Housing of Pigs* (Bulletin No. 160); V. C. Fishwick, *Pigs, Their Breeding, Feeding, and Management*, 1949; J. W. Reid, *Pigs*, 1949; H. L. Tinley, *Good Pig-keeping*, 1951; H. R. Davidson, *The Production and Marketing of Pigs*, 1953.

Pig-footed Bandlefoot, see CHOEROPUS CASTANOTIS.

Pig Iron, see IRON AND STEEL.

Pig-sticking, see HOG-HUNTING.

Pigeon, or Dove, any member of the Columbidae, order Columbiformes, the latter also including the extinct dodo and

solitaire, the tooth-billed P. (*Didunculus strigirostris*) of the Samoan Is., and the beautiful crested crowned P.s. of New Guinea. The 4 Brit. species are the large wood P. or ring-dove (*Columba palumbus*), which often does serious damage to crops; the stock-dove (*C. oenas*); the turtle-dove (*Streptopelia turtur*); and the rock-dove (*Columba livia*), from which many of the domesticated breeds of P. are derived. See PASSENGER PIGEON.

Domestic pigeons exist in great variety, all parts of the body having been developed to give the marked characteristics of the different breeds, from the dainty fantail to the pouters and croppers which can enlarge or distend the crop or pout; from the tiny tumblers to the huge runts. Wide differences occur also in the plumage; in the archangel it has a beautiful lustre; in the Jacobin the feathers of the neck and head form a large hood and mane, and between the numerous breeds is a wide range of colouring. The scanderon has a long curved beak, the owl a very short and stout one; in the carrier, which is not used like the homer for carrying messages, the beak and eye wattles are enormously developed. The P. fancy is now very large, and a great number of shows are held annually. Particularly choice and successful specimens have been sold for over £100, and £20 to £50 is often paid for single birds. The best P.s. for the table are of Fr. origin, such as the Mondain, Montauban, and Carneau.

Pigeon, Wood, see WOOD-PIGEON.

Pigeon-flying. After 1871, following on the use of pigeons during the Paris siege, the sport became immensely popular, and there were few towns which had not a P. club, many being enrolled under the National Homing Union, formed in 1896. In some of the races very high speeds have been made. In 1896 a bird flew from Thurso to London, 511 m., at the rate of 1454 yds. per minute. Birds have actually returned from a distance of 1000 m. Since the time of the Romans homing pigeons have been used to convey messages in military operations. Pigeons were used extensively as messengers by both sides in the First World War: in the Second World War they were frequently used by the secret service and partisans, particularly in Yugoslavia. Aircraft of Coastal Command all carried at least one pigeon to establish contact with their base, should the plane be forced down and the transmitter wrecked.

Pigeon Pea, or *Cajanus indicus*, species of Leguminosae forming a genus in itself, and is known by other popular terms, such as dhal and Congo pea. It flourishes in India, where it is eaten like an ordinary pea.

Pigeon-shooting. The shooting of wood-pigeons is a difficult sport on account of the natural shyness of the bird and its rapidity of flight. Shooting is generally done in the evening as the birds return to their roosting places in flocks. Another method is for the sportsman to conceal himself in the early morning in a wood where beech mast or acorns are plentiful,

trusting to the presence of a few decoy birds to attract the pigeons within easy range. Trap shooting, the birds being suddenly liberated from a collapsible box, was prohibited in 1921.

Clay P. is shooting at a clay saucer thrown into the air from a trap as a mark. The governing body in this country is the Clay Pigeon Shooting Association (276 Whitechurch Lane, Edgware, Middlesex), which organises a number of championships and an international tournament.

Pigments are insoluble substances which, in a finely divided form, impart colour and opacity to other substances such as paints (q.v.), plastics, rubber, etc. They may also possess other properties, such as rust inhibition in the case of red lead, which enhance their value. They can be broadly divided into naturally occurring P., manufactured inorganic P., and organic P. and lakes. For purposes of this review, it is convenient to group some P., such as Prussian blue, which contain carbon atoms, with the inorganic group.

NATURALLY OCCURRING PIGMENTS include the very important group known as the earth colours. The most important of these is red iron oxide, which varies in strength and purity of colour according to the dist. in which it is mined, those from Spain and the Persian Gulf being the brightest. Red oxide is widely used as the pigment for iron and steel protective paints. The umbers and siennas are impure oxides of iron, and contain manganese oxide. The umbers are deep brown, and the siennas are yellowish brown or red, and both have low opacity, thus being used mainly as graining colours or stainers for tinting whites. They can be calcined to form burnt umber and burnt sienna, and this process changes the shades to a considerable degree. The ochres are a class of yellow or yellowish brown P. which consist basically of clays containing iron oxide. They vary very considerably in strength and colour, and are used mainly as stainers. Micaceous iron oxide is a lustrous black pigment which is used to some extent in iron and steel primers. Green earth is an iron silicate which may contain compounds of the alkali metals. Although very permanent, it does not possess great strength or brilliance, and is used mainly as a base for lime green. It is sometimes known as terre verte.

INORGANIC PIGMENTS. Whites. White lead is basic lead carbonate and is used mainly in primers and undercoats for exterior woodwork. It has lost its popularity in finishes owing to its tendency to blacken in sulphur-containing atmospheres. Zinc oxide has also lost much of its popularity owing to the fact that, being basic, it reacts with acids present in paint media, causing the paint to become too stiff to use. It is, however, an excellent white. Basic lead sulphate is not widely used, and is not so effective as white lead. Lithopone is a co-precipitated mixture of zinc sulphide and barium sulphate, and is widely used in undercoats, water paints, and interior paints.

It has poor durability. Titanium dioxide has become very widely used on account of its enormous opacity, its inertness in acid media, and its excellent whiteness. It is available in two crystalline forms, anatase and rutile. The anatase form suffers from excessive chalking on exterior exposure, but this is not so with the rutile form. Antimony oxide is used to some extent, as it renders zinc oxide films less brittle and reduces the chalking tendency in the titanium oxide P.

Blacks can be divided into three broad groups: the high-carbon-content blacks made from the incomplete combustion of hydrocarbon gases or coal-tar oil (carbon black, lamp black, and vegetable black), the low-carbon blacks made from calcined bones (bone and drop blacks), and black oxide of iron. The carbon blacks and drop blacks give the richest black, and the others are principally used for tinting.

Yellows can also be divided into 3 groups: the yellow oxides or ferrite yellows (made by precipitating ferric hydroxide), the chromates, zinc, primrose, lemon, golden, and orange chromes (the zinc being zinc chromate, whilst the others consist of lead chromate together with lead sulphate in the case of the primrose and lemon shades; golden and orange chromes being the normal and basic lead chromates respectively), and the cadmium yellows, which are also in primrose, lemon, golden, and orange grades (made by the precipitation of cadmium sulphide with zinc sulphide in the pale shades and cadmium selenide in the deeper shades). The yellow oxides are strong but dull in tone, whilst the chromates and cadmium P. are brilliant. The cadmium P., whilst very fast to light and high temperatures, are much more expensive than, and not so strong as, the chromes. Zinc chromate is a useful anti-corrosive pigment much used in primers for non-ferrous metals.

Blues are small in number. Prussian blue (potassium ferriferrocyanide or ammonium ferriferrocyanide) is a strong, greenish blue which is resistant to acids but sensitive to alkalis. Ultramarine blue (made by calcining china clay, silica, soda ash, sulphur, and a reducing agent) is a reddish blue which is sensitive to acids. Monastral blue is an organic pigment resistant to both acids and alkalis.

Greens are basically mixtures of the yellow and blue P. above (except for chromium oxide), and have both the qualities and defects of the constituent P. Mixtures of Prussian blue and lead chromate pigments are known as Brunswick greens. Chromium oxide is extremely fast to light, heat, acids, and alkalis. The hydrated oxide of chromium is known as Guignets' Green.

Reds. Turkey red and the Indian reds are artificially prepared oxides of iron, but are stronger, brighter, and finer than the natural earth colours. Scarlet chrome consists of lead chromate co-precipitated with lead molybdate, and is a very brilliant red. So also is cadmium red, which consists of cadmium sulphide and selenide,

and, although expensive, has great fastness to light and heat. Red lead (triplybasic tetroxide) has powerful rust-inhibiting properties, and is used in iron and steel primers.

Browns. The artificially produced iron oxides can also be made in chocolate and purple browns. These are stronger, finer, and more opaque than natural earth colours.

ORGANIC PIGMENTS can be divided into 2 groups: the toners or pure dyestuffs, containing no diluents, and the lakes, in which the dyestuff is precipitated on to a transparent base such as alumina or blanc fixe. The dyestuffs themselves are many and varied, and are capable of producing an almost infinite range of colours, including black. The azo P. are derivatives of azo-benzene, and cover most of the yellows and reds. Azo P. include Lithol red, Helio red, Para red, permanent red, orange and bordeaux, and the Hansa and Benzedine yellows. A further useful group of dyestuffs are the anthraquinone derivatives, which in the main show good fastness to light. P. in this group include madder lake and scarlet, orange, and Bordeaux madder lakes. The basic dyestuff lakes include some extremely brilliant colours, and are prepared by precipitating the dyestuff with tannic, phosphotungstic, and phosphomolybdic acids. Many valuable green and blue P. fall into this group, e.g. lime green can be prepared from brilliant green struck on green earth. There are many other insoluble dyestuffs which are useful as P., e.g. the phthalocyanines (q.v.), which form a small but most important group of blue and green P., of which Monastral blue is one. See PAINT; DYE.

See L. S. Pratt, *Chemistry and Physics of Organic Pigments*, 1947; Oil and Colour Chemists' Association, *An Introduction to Paint Technology*, 1949; Noel Heaton, *Outlines of Paint Technology*, 1956.

Pigments of Animals, see ANIMALS, COLOURS OF.

Pigmy or Royal Antelope (*Neotragus pygmaeus*), the smallest of the antelopes, standing only 10 in. in height, which lives in Guinea. The horns are 1 in. long and are inclined backwards.

Pignatelli, Antonio, see INNOCENT (popes), INNOCENT XII.

Pignerol, see PINEROLO.

Pigott, Richard (1828-89), Irish journalist, b. co. Meath. He supplied *The Times* with forged documents, which were used in all good faith by that newspaper as the basis of the articles 'Parnellism and Crime' in 1887 (see PARNELL). The Parnell Committee was appointed to investigate the matter, and the forgeries were exposed; whereupon P. fled to Madrid and shot himself to escape arrest. See his *Personal Recollections of an Irish Journalist*, 1882.

Pigou, Arthur Cecil (1877-), economist, educ. at Harrow and King's College, Cambridge. He was successively Jevons memorial lecturer, Univ. College, London (1903-4); Girdler's univ. lecturer in

economics, Cambridge (1904-7); prof. of political economy, Cambridge Univ. (1908-43). Among his many works *The Theory of Unemployment*, 1933, is outstanding. The subject of the book is the disequilibrium that takes effect in unemployment, whether due to a change in the demand function for labour or to wage policy. It was described by Lord Keynes as 'the only detailed account of the classical theory of employment which exists.' In his work P. approaches the subject from the non-monetary or, as he calls it, the 'real' standpoint. He argues that it is possible 'to study the problem of unemployment either from the money end or from the real end. The two studies, if made complete and carried through correctly, must necessarily come to the same thing, their analyses meeting in the middle.' Other works include *The Economics of Welfare*, 1920, in which he broke new ground in analysing the distribution and stability of the national income and the relation between wealth and welfare; *Industrial Fluctuations*, 1926; *A Study in Public Finance*, 1928; *Economics in Practice*, 1935; *Socialism versus Capitalism*, 1937; *Employment and Equilibrium*, 1940; *Lapses from Full Employment*, 1945; *Income, an Introduction to Economics*, 1946; *The Veil of Money*, 1948; *Essays in Economics*, 1953; *Alfred Marshall and Current Thought*, 1953.

Pilper, Willem (1894-1947), Dutch composer, b. Zeist, studied under Wagenaar at the Utrecht Music School, and was influenced by the contemporary Fr. school, on the one hand, and by Mahler, on the other. He became the most important Dutch composer of his generation and had a number of distinguished pupils. His works include the opera *Halewijn*, 1934, music for plays by Sophocles, Euripides, Shakespeare, and Vondel, 3 symphonies, concertos, chamber music, sonatas for various instruments, piano music, and songs.

Pika (sometimes spelled Pica), mouse-hare, calling-hare, or piping-hare, a tailless rodent belonging to the family Ochotonidae and related to the hares and rabbits (Leporidae). They have short ears, and there are no scent glands in the groin. P.s are gregarious animals living in burrows and rock crevices in the mountainous regions of Central Asia and N. America. They lay up stores of food for the winter, but do not hibernate.

Pike, term applied to the members of the genus *Esox*, which is typical of the family Esocidae; they are fresh-water fishes and occur in the temperate parts of Europe, Asia, and America. In diet they are carnivorous, and prey on almost any animal they can obtain, from frogs and fishes to ducklings, rats, voles, and newts; their voracity is notorious. In colour the common P., *E. lucius*, is olive-grey above, silvery below, and has pale spots; in length it generally attains from 2 to 4 ft. Other names of this species are jack, hake, luce, and pickerel. *E. nubilus*, the maskinongy of N. America, may grow to a length of 8 ft. See G. W. Maunsell, *The*

Fisherman's vade mecum in most matters relating to Fishing for Trout, Sea Trout, Salmon, and Pike, 1938, and J. Bickerdye *Angling for Pike*, 1949.

Pike, military weapon, consisting of a long shaft or handle with an iron head. Some such weapon had been in use from very ancient times, but the word itself dates from the 15th cent. From that time it was in regular use as the arm of a large part of the infantry, who were called 'pikemen,' and was sometimes as long as 20 ft. It was gradually reduced in length, and in the 17th cent. it was superseded by the bayonet. The P. often had a spike at the end to enable it to be stuck in the ground.

Pikemen, see **SPEAR**.

Pike's Peak, height in the Rocky Mts. in El Paso co., near Colorado Springs. It is about 14,100 ft high, is partially covered with forests, and can be ascended by a cog railway.

Pila (Ger. Schneidemühl), tn of Poland, in Poznań prov., 48 m. N. of Poznań (q.v.). Until 1945 it was in Pomerania (q.v.), and it was cap. of the Grenzmark Posen-Westpreussen prov. 1922-38. There was very severe damage during the Second World War. There are manufs. of machinery and glass, and there is a trade in livestock and timber. Pop. 30,000.

Pilar, port of S. Paraguay, cap. of Neembucú dept. Cotton, timber, and oranges are grown; hides are produced in the vicinity. There are also cotton ginneries, distilleries, and sawmills. Pop. 10,300.

Pilaster, in classical architecture, a flat column built into a wall (i.e. 'engaged') and projecting therefrom a distance of not more than one-third of its surface breadth. Originally used as a 'respond' on one side of an arch, the P. later tended to become a decorative rather than a structural feature. A Gk P. is called an *antla*.

Pilate, Pontius, see **PONTIUS PILATE**.

Pilate's Staircase, see **SANTA SCALA**.

Pilatus, Mount, mt of Switzerland, on the S. shore of Lake Luzern, and between the cantons of Luzern and Unterwalden. The Tomlishorn, its highest point, is 6998 ft, and its ascent can be made by means of a railway. Its name is from 'pileatus', capped, and not from its being traditionally the scene of the death of Pontius Pilate.

Pilehard, or *Sardina pilchardus*, fish of the large family Clupeidae, and related to both the herring and the sprat. In size it grows from 10 to 14 in.; in colour it is bluish-green above, whitish underneath and on its sides. It is entirely marine in habit, and its eggs float near the surface of the sea, unlike those of the herring, which are attached to objects at the bottom. The young P., before it has attained maturity, is known as the sardine, and as such forms a valuable fishery; the full-grown P. is used as an article of diet as well as for bait. The method of capture is usually by drift-net. *S. pilchardus* is most abundant off the coasts of Portugal and Morocco, and in the Eng. Channel and the Mediterranean.

Pilcomayo, riv. of S. America. Its source is in Bolivia, about 60 m. NW. of Potosí, on the E. slopes of the E. Cordilleras. Leaving the S. extremity of the Aullagas plateau, it flows E. and S. through the Sierra region to the Bolivian Chaco and joins the Paraguay a little S. of Asunción. It has a length of 1100 m.

Pile-driving, see **FOUNDATIONS**.



Swiss National Tourist Office
MOUNT PILATUS RAILWAY,
SWITZERLAND

This is the steepest cog-wheel railway in the world.

Pile Dwellings, prehistoric habitations built on a platform supported on piles driven into the margins of lakes, rivers, or the sea. In Europe they are found in the Alps and in the Jura. The objects recovered from P. D. are often in a remarkable state of preservation, the mud or peat in which they are contained acting as a continuous water-bath. In this way the wooden handles of tools, and weapons, wooden bowls, wickerwork, woven fabrics, fruit, and even identifiable pollen grains have been recovered. Much is known of P. D. in the W. Alps which belong to the Neolithic period, and a type station is recognised at Robenhäusen on Lake Pfäffikon, near Zürich. Fishing and hunting of deer and wild ox went side by side with the domestication of animals, the eating of fruit, and the growing of wheat and of flax for textiles. Tools and weapons were of stone, wood, and bone, and table-vessels were of wood and pottery. There was no naturalistic

art, but representations of religious symbols are found. In Britain, the famous lake-vil. of Glastonbury represents the La Tène culture of the Early Iron Age. Strictly speaking, it is not a vil. of P. D., but the terms are often used synonymously. The crannogs of Ireland and Scotland bear some relation to P. D. See CRANNOG; PREHISTORY.

Pilea, genus of Urticaceae, also known as stinging nettle, dwarf foliage plants with small green leaves. *P. muscosa*, Gunpowder or Pistol Plant, a branching herb of tropical America, is grown for its habit of releasing pollen in a cloud when shaken.

Piles, or Haemorrhoids, varicose condition of the veins of the lower end of the rectum. P. are known as internal or external, according to whether they are situated within or without the sphincter ani, the muscular ring which closes the anal orifice. In the former case they are covered with mucous membrane, and may be so protruded as to escape through the anal orifice; in the latter case they are covered with skin, and may either form hard tumours or discharge as bleeding P. P. are a symptom of any condition by which the veins of the lower bowel become congested. Habitual constipation, the condition of pregnancy, growths in the rectum, and local inflammation are liable to be accompanied by the formation of P. They may make their appearance after a strong effort at defecation, or after sitting on cold or wet ground. They may cause little trouble, but if strangulated by the sphincter ani or inflamed by any cause they are apt to occasion extreme discomfort. In most cases they submit to treatment in which scrupulous cleanliness, good bowel action, plain food, and soothing ointments have their part. Astringent injections may be tried if the haemorrhage is excessive. As a last resort they may be removed by surgical operation. Cancer (carcinoma) of the rectum is often mistaken for P., so that in all cases of doubt, and particularly in individuals over 40 years of age, a complete rectal examination is indicated.

Pileus, mycological term for the cap or hymenium-supporting part of a higher fungus, chiefly Hymenomycetes. The upper surface is round or convex, bearing the hymenium of gills or tubes on the underside; the whole is borne on a stalk or stipe.

Pilgrim, name given to a person who travels to visit holy shrines, tombs, or places of religious interest. Pilgrimages to Jerusalem, Bethlehem, and other scenes of Our Lord's life and death began at an early period, probably about the time of Constantine, and were popular during the Middle Ages, notably to the shrine of St James at Compostella. The most famous of modern shrines are those of Our Lady at Lourdes and, in England, of Our Lady of Walsingham. The practice is one universally natural to man, e.g. Muslims practise pilgrimage, especially to Mecca, Hindus go on pilgrimage, notably to the Ganges, Buddhists go to the Temple

of the Tooth at Kandy, etc. See S. Heath, *In the Steps of the Pilgrims*, 1949; H. F. M. Prescott, *Jerusalem Journey*, 1954; Daniel-Rops, *Cathedral and Crusade*, 1957.

Pilgrim Fathers, name given to a party of 102 Puritans, of whom 74 were men and 28 women, members of John Robinson's church at Leyden, who, on 6 Sept. 1620, sailed from Plymouth in the *Mayflower* to seek freedom of worship for their own faith in New England. They landed on Plymouth Rock on 16 Dec. 1620, and their settlement later formed part of Massachusetts. See J. Brown, *The Pilgrim Fathers of New England*, 1920, and G. F. Willison, *Saints and Strangers*, 1947.

Pilgrim Trust, fund founded in 1930 by the late Edward Stephen Harkness, an Amer. citizen, who placed £2m. in the hands of Brit. trustees for the benefit of Great Britain and her people. At the end of 1955 the mkt value of the P. T.'s investments stood at £34m. Since 1930 a total of nearly £3m. has been distributed in grants. Before the Second World War approximately half the trustees' income was allocated annually to schemes for the welfare of the unemployed and others affected by the economic conditions of that period. Since 1945 the bulk of the trustees' resources have been devoted to the repair and preservation of historic buildings and to the furtherance of art and learning.

Pilgrimage of Grace, rising which took place in 1536, in protest against the dissolution of the monasteries, but also against agrarian injustices resulting from the enclosure movement. Its leader was Robert Aske (q.v.), and it affected all the N. cos., but especially Yorks and Lincs. The insurgents took possession of York and then moved on to Doncaster some 30,000 strong. Aske persuaded his followers to disperse on promise of a pardon from the king and an investigation of their grievances. Henry hired him to London, and he was tried for high treason and eventually hanged at York (1537). The rising, however, had collapsed the preceding year.

Pilgrims of Great Britain, Anglo-Amer. dining club, existing to promote friendship between the two nations. The London branch was founded in 1902, the New York branch a year later. Traditionally each new Amer. ambas. to Britain makes his first public speech as ambas. to the P. The P. sponsored the erection of a statue in Grosvenor Square, London, to the late president of the U.S.A., Franklin D. Roosevelt, 1948.

Pilgrims' Way, prehistoric trackway linking E. Kent with the Winchester dist. For the greater part of its course it runs along the escarpment of the N. Downs, above the spring-line at the junction of the Chalk rock and Gault clay, and its general line is marked by Canterbury, Chilham, Charing, Hollingbourne, Chovening, Guildford, and Winchester. It breaches the rampart of the Early Iron Age camp at Bigbury, near Canterbury, and is thus contemporary with or earlier

than that earthwork. Coins of the Early Iron Age are associated with its route, and in Rom. times, although its course was never straightened, it was used, as discoveries along its course show, for communication and trade. The alleged use of the road by medieval pilgrims to the shrine of St Thomas at Canterbury is an antiquarian fancy and quite unproven after strict investigation. There is a large bibliography. See J. Cartwright (Mrs H. Ady), *The Pilgrims' Way from Winchester to Canterbury*, 1895 ed., and H. Belloc, *The Old Road*, 1911, 1935, for the popular tradition; and F. C. E. Erwood, *The Pilgrims' Road*, 1923, and *Archaeologia Cantiana*, vol. 37, 1925, p. 1, for the now generally accepted view.

Piling. Piles are used to support the foundations of buildings and other structures where the ground is of unsound material, e.g. peat, alluvium, etc., or where structures such as wharves, jetties, etc., are most easily constructed on a piled foundation. For timber piles greenheart, elm, beech, jarrah, and pitch-pine are used. The heads are protected by a band of iron and the pointed ends by iron shoes. Reinforced concrete piles are now largely used in place of timber. Proprietary methods of P. include the driving of a steel shell or a mandrel, making possible the casting of concrete piles *in situ*. *Sheet piles* are flat piles of timber, reinforced concrete, or special steel section driven close together to form a retaining wall or a barrier that can be rendered watertight as a protection for other works under construction. The common apparatus for driving consists of a heavy ram working between slides. The ram is hauled up some 8 ft. by a rope and pulley and released so that it falls on to the head of the pile. Tubular or screw piles of cast iron or steel are sometimes used. Provided with a screw blade at the bottom, they are sunk by means of a capstan on the head or by a water jet. Short piles, up to 10 ft. can be formed in soft soil by boring holes with an earth auger and subsequently filling with concrete. See also FOUNDATIONS. See R. D. Chellis, *Pile Driving Handbook*, 1944; D. H. Lee, *Sheet Piling, Cofferdams, and Caissons*, 1945; Amer. Society of Civil Engineers, *Pile Foundations and Pile Structures* (Manuals of Engineering Practice, No. 27), 1946; and *Kempe's Engineer's Year Book*, 1957.

Pilkington, Francis (?-1638), composer, b. probably in Lancs, took the B.Mus. at Oxford and became a clergyman at Chester. He published 2 books of madrigals (1614 and 1624), a book of ayres to the lute, and contributed to *Leighton's Teares and Lamentacions*, 1614.

Pill, small round mass containing one or more medicinal ingredients intended for absorption into the system from the stomach or intestines. It is a form especially applicable to those drugs which are taken in small doses, and recommends itself to most people on account of the ease in swallowing and the comparative absence of disagreeable taste. If the

substance is not of a consistency adaptable to the P. form, it is mixed with a material termed an excipient, such as bread-crumbs, mucilage, treacle, soap, and conserve of roses. Where it is required to disguise the taste of any drug, P.s are coated with sugar or other material. When they are required to act in the lower intestinal region, P.s are coated with keratin to delay solution.

Pillar, in architecture, term of wider application than the term 'column.' It signifies any detached vertical mass, whether monolithic or built up in courses, constructed of any solid material. It may be used as a support for some superstructure or as a memorial column, whereas a column is, strictly speaking, a P. of fixed proportions (see ORDERS). P.s in general may be of any shape in section and of various proportions. Since medieval P.s were not regulated by the strict rules of proportion that governed the construction of the classical column, the two terms are used generally here to distinguish the work of the one period from that of the other. A wooden P. is usually termed a 'post.'

Pillar Saints, see STYLITES, ST SIMON.

Pillars of Hercules, see HERCULES.

Pillau, city and seaport of W. Kaliningrad oblast, Russian S.F.S.R., until 1945 in E. Prussia. It is 25 m. W. of Kaliningrad (formerly Königsberg), on the Gulf of Danzig (Gdansk). It is a naval base with shipyards and fishing industries. It is now called Baltiysk. Pop. (1939) 12,380.

Pillnitz, Ger. vil. in the dist. of Dresden, on the Elbe, 7 m. ESE. of Dresden (q.v.). A treaty signed here in 1791 defined the attitude of Austria and Prussia to the Fr. Revolution. The vil. was the summer residence of the Electors of Saxony. Photographic equipment is manuf. Pop. 1500.

Pillory, instrument for the public punishment of malefactors, now obsolete. It consisted of a wooden frame (with circular holes for the head and arms), in which the prisoner stood. It was found to be quite inadequate as a form of punishment, and abolished in England in 1837. See also STOCKS.

Pillow Lava, a volcanic rock formed by the extrusion of L. into the sea or a lake. Contact with the water cools the L. and causes it to develop a solid crust. As more L. wells up from below it forces its way through cracks in this crust and in turn chills and solidifies in a pile of rounded masses or 'pillows.'

Pilocarpine, colourless oily alkaloid of the formula $C_{11}H_{15}O_3N$. It occurs in *Jaborandi* leaves, is extremely poisonous, and is used in hair-restorers and medicine.

Pilot Fish, small subtropical fish of the horse-mackerel family (*Naucrates ductor*), about 12 in. long, spindle-shaped, steel blue in colour, and marked with 5 to 7 dark vertical bars. It owes its scientific and popular Eng. name to its habit of accompanying ships and large fish, generally sharks, doubtless for the sake

of food, for apparently the P. F. obtains much of its food from the parasitic crustaceans with which large fish are infested and also from the small pieces of food unregarded by the shark when it rends its prey. The old notion that the P. F. acted as a pilot and indicated to sailors the proximity of land is fabulous. It is the *pompilus* of the ancients and Ovid calls it *comes ratium* (*Halieutica*, 101). The Ca'ing (q.v.) whale receives its alternative name, pilot-whale, from the fact that if the leader happens to run ashore the whole school usually follows.

Pilot Officer, see **RANK**, *Royal Air Force*.

Pillars (Fr. *pillotis* = stilts), pillars supporting modern reinforced-concrete buildings, and standing free in an open storey at ground-level, often utilised for car-parking.

Pilots (Sea), strictly speaking, persons not belonging to any particular ship who are authorised to conduct ships through certain rivers, roadsteads, or channels, or into certain ports, and who are usually taken on board at a particular place for that purpose only (Marlachlan's *Law of Merchant Shipping*). P. may be either licensed or unlicensed. A licensed pilot is one who holds a licence, issued by the pilotage authority for the dist., to act in the limits named in his licence. A licensed pilot is always empowered to supersede an unlicensed pilot, and a master who knowingly employs an unlicensed pilot after a licensed pilot has offered to take charge of the ship, or signalled for that purpose, is liable to a fine, as is also the unlicensed pilot, for knowingly continuing to act in such circumstances. A ship, whilst navigating in a dist. in which pilotage is compulsory, for the purpose of entering, leaving, or making use of any port in that dist., is required to be either under the pilotage of a licensed pilot of the dist., or under the pilotage of a master or mate possessing a pilotage certificate for the dist., who is bona fide acting as master or mate of the ship. A ship carrying passengers (other than an excepted ship) is, however, compelled to be under pilotage irrespective of whether the dist. in which it is navigating is a compulsory one or not. The Corporation of Trinity House is the prin. pilotage authority of the U.K. and has the control of all matters relating to pilotage in the port of London and 40 other dists., including Southampton; other dists. are controlled by their own local pilotage authorities. The law relating to P. and pilotage is now consolidated in the Pilotage Act, 1913. By Section 11 of this Act the following ships are excepted from compulsory pilotage: (1) ships belonging to her majesty; (2) pleasure yachts; (3) fishing vessels; (4) ferry boats; (5) ships of less than 50 tons gross tonnage; (6) ships exempted by by-law; (7) tugs, dredgers, sludge vessels, barges, and other similar craft belonging to or hired by a dock, harbour, or riv. authority; (8) ships calling at a port in a pilotage dist. for the sole purpose of taking on board or landing a pilot belonging to some

other pilotage dist. The pilotage authority makes the necessary by-laws for the regulation of pilotage and P. in its dist., but these do not take effect until they are confirmed by the minister of transport. The Ministry of Transport has the power, on the representation of parties interested, to revoke or vary any by-laws in a pilotage dist., or require the pilotage authority to make by-laws. A pilotage authority may grant a pilotage certificate to any person who is bona fide the master or mate of any ship if after examination they are satisfied that having regard to his skill, experience, and local knowledge he is capable of piloting the ship of which he is master or mate within their pilotage dist. Under the Aliens Restriction (Amendment) Act, 1919, pilotage certificates cannot be granted to aliens, except to masters or mates of Fr. nationality trading to the ports of Newhaven or Grimsby. See also **MERCHANT SHIPPING ACTS**.

Pilpay, legendary Indian philosopher, see **BIDPAI**.

Pilsen, see **PIZEN**.

Pilsudski, Joseph Clemens (1863-1935), Polish statesman and soldier, b. Vilna, and educ. at Vilna and Zharkov, where he developed Socialist sympathies, being deported to Siberia in 1887. In 1892 he settled at Łódź, where he joined the newly formed Polish Socialist party, which aimed primarily at liberating Poland from Russian rule. He was re-arrested, but escaped and settled at Cracow, where he worked to form a Polish legion for his country's deliverance. At the beginning of the First World War, P. invaded Russia at the head of his legion, but in 1916 Ger. military methods caused him to resign his command, and he was subsequently arrested and interned at Magdeburg. Freed by the armistice in 1916, P. became president of the new Polish republic in the following year, receiving the rank of marshal. In 1920 P. carried out a rapid advance against the Bolsheviks across the Pripyet marshes on Kiev. His advance was, however, checked at Kiev, and his armies eventually driven back on Warsaw. After the conclusion of peace with the Bolshevik Gov., P. lost favour and temporarily retired. In 1926 he overthrew the gov. by a military *coup d'état*, and became Prime Minister from 1926 to 1928 and again for a brief period in 1930. From 1926 until his death he was minister of war, and during this period the Polish constitution was altered until it became, in effect, a dictatorship. Among his books are *Rok*, 1920, and *Historical Corrections*, 1931. See lives by R. Landau, 1931; E. J. Patterson, 1935; and F. Reddaway, 1939.

Pilttdown Man, or *Eoanthropus Dawsoni*, named from its discoverer, who, in 1912, found pieces of a primitive human skull at Pilttdown, Sussex, England. Animal bones, rough flint tools, and a pointed tool of bone were also found. It was long thought that the remains represented one type of human alive at the beginning of Pleistocene times. Detailed technical examination by modern methods in 1953-4

showed that the so-called human jaw is almost certainly that of a young orang-outang; that the cranium, although human and anct., had been artificially stained to match the gravel from which it was recovered; that the animal remains and the flint tools had been similarly treated; and that the bone tool had been cut with a modern steel knife. The whole of the material must be regarded as fraudulent. The high standard of modern technical examination, which includes tests for radioactivity and fluorine content, will make such a forgery almost impossible in the future. See J. S. Weiner, *The Piltdown Forgery*, 1955.

Pima, Amor. Indian tribe in Mexico and N. America, estimated to number about 12,000. They inhabit the W. coast and Sierra Madre areas of Mexico and Arizona, from the R. Gila to Jalisco in the S. They are agric. and noted for their pottery and basket-work; but in the 18th cent. they were one of the most warlike tribes, frequently revolting against Sp. rule.

Pima Language, see NORTH AMERICAN NATIVE LANGUAGES, *Pacific Areas*.

Pimelea, family Thymelaeaceae, Australasian genus of evergreen shrubs, over 100 species; of which *P. rosea*, *P. spectabilis*, and *P. hypericina* may be grown for their flower-heads in the greenhouse.

Pimenta, family Myrtaceae, genus of 5 species of highly fragrant trees, or shrubs. *P. officinalis*, a shrub, is the Pimento-bush or Allspice, of Jamaica; *P. acris*, a tree, the Wild Clove or Bayberry of the W. Indies. Sometimes grown in stovehouses in Britain.

Pimentel, port and summer resort of Peru, 8 m. SW. of Chiclayo. Pop. 4000.

Pimlico: 1. Formerly the pleasure centre of Hoxton (q.v.).

2. Residential dist. of London, in the City of Westminster, and sometimes known as S. Belgravia. Some authorities considered that the dist. of P. embraces the whole of Belgravia (q.v.), which it adjoins on the NW. side. It was developed by Thomas Cubitt after his development of Belgravia. There are various explanations of the name, none supported by convincing evidence.

Pimpernel (*Anagallis*), genus of ann., biennial, and perennial plants of trailing habit (family Primulaceae), bearing small, often numerous, red flowers. The common P. or poor man's weatherglass (*A. arvensis*) occurs in most cornfields; varieties of it are grown on rockeries. The bog P. (*A. tenella*) is a tiny but beautiful bog plant with rose-pink, funnel-shaped flowers. The yellow P. is *Lysimachia nemorum*, a pretty woodland plant with bright yellow, star-like, solitary flowers.

Pimpinella, or Burnet Saxifrage, genus of ann. and perennial plants (family Umbelliferae). *P. saxifraga* and *P. major* are Brit. plants. The fruit of *P. anisum* is the aniseed of commerce.

Pimple, see PAPULE.

Pinaceae, a family of coniferous trees, containing 24 genera and 300 species,

chiefly native to temperate regions. Important genera include Abies, Araucaria, Cedrus, Chamaecyparis, Cryptomeria, Cupressus, Juniperus, Larix, Libocedrus, Picea, Pinus, Sequoia, Thuja, and Tsuga (qq.v.).

Pinakothek, gallery in the Propylaea, in anct. Athens, where consecrated treasures were kept. Imitations of it were built in Munich by Louis I of Bavaria in 1836 and 1853 to house art collections.

Pinar del Río: 1. Hilly W. prov. of Cuba. The chief products are tobacco (Vuelta Abajo), which is of the finest quality, sugar, coffee, rice, wood, and corn. There are rich mineral deposits. Area 5211 sq. m. Pop. 448,500.

2. Cap. of the above prov. 95 m. WSW. of Havana. It makes the best cigars and tobacco. Pop. 26,300.

Pinchbeck, reddish-yellow alloy of copper and zinc, the average proportion in which the metals enter into it being 90 per cent copper and 10 per cent zinc, but the composition is variable. It was used formerly in the manuf. of cheap jewellery and watch-cases and is said to have been invented by Christopher P., an 18th-cent. London watchmaker.

Pinckney, Charles Cotesworth (1746-1825), Amor. statesman and soldier, b. Charleston, S. Carolina. The son of a wealthy planter, he was educ. at Oxford Univ. and at a military college in Caen, France. Returning home, he practised at the Bar in his native city, became a member of the S. Carolina prov. legislature, an officer in the S. Carolina militia, and president of the S. Carolina Senate. Serving with the army of the Amer. colonists in their war with England, he was captured in 1780 and held prisoner for nearly 2 years. A leading figure in the Amer. constitutional convention, he opposed anything that would make for the abolition of slavery. In 1796 he was sent as Amer. minister to France at one of the most troubled periods of the young rep., but the Fr. Gov. refused to receive P., and he had to take refuge in Holland. Later President John Adams sent him back to France, accompanied by John Marshall and Elbridge Gerry. The mission was not acceptable to Talleyrand unless certain conditions were fulfilled; and when the facts became known in America (1798) there was a popular demand for an immediate declaration of war on France. The French, immensely surprised at the spirit of the young country, withdrew their demands. P. was the nominee of the Federalist party for vice-president in 1800 and for president in 1804 and 1808, but was defeated each time.

Pindar (518-c. 438 BC), Gk lyric poet, b. Cynoscephalae in Boeotia. In his youth he was defeated in a poetical contest by Corinna, who is said to have warned him to sow his mythological detail 'by the handful, not the sackful.' His earliest extant poem (*Pythian* x) dates from 498; in the next 40 years he became a famous figure throughout the Gk

world, from Sicily to Rhodes, from Macedon to Cyrene. His works were collected in 17 books, and included hymns, paeans, dithyrambs, processional songs, maiden-songs, hyporchemata, encomia, dirges, and epinicians (odes for victors in the Games). These last, in 4 books, have survived complete. They celebrate victories gained in the Olympian, Pythian, Nemean, and Isthmian games. Of his other poetry we have only fragments, latterly augmented by papyri. P.'s power lies not in his ideas, which are often naive and muddled, but rather in an amazing splendour of language, rhythm, and imagery, which has made his poetry impossible to translate, and fatal to imitate. This praise of athletes was indeed one of the most purely aesthetic writers there have ever been. The only value of his moralising for the modern reader lies in a grace and magnificence of phrase and symbol such as few poets in the world have attained. The best complete editions of the *Odes* are those of C. M. Bowra (1947) and L. R. Farnell (with trans. and commentary, 1930). See G. Norwood, *Pindar*, 1945.

Pindar, Peter, see WOLCOT, JOHN.

Pindemonte, Ippolito (1753-1828), It. poet, b. Verona, of a rich and cultivated family. Early in life he displayed poetical taste and ability, and travelled in Switzerland, England, Germany, and France (1788-90). In 1789 he pub. *La Francia*, on the Fr. Revolution. His prin. works are the *Poesie Campestri* (1788), filled with charming descriptions of Brit. scenery; *Arminto*, a tragedy, 1804; *Epistole in versi*, 1805, dealing with contemporary events; *Indici Sermoni poetici*, 1808; *Elogi di letterati*, 1825-6, composed in fine prose, and a trans. of the *Odyssey*. They are all more or less tinged with melancholy, and graceful and classic in manner. See *Le più belle pagine di I. Pindemonte*, ed. Angioletti, 1933; and studies by S. Peri, 1904; M. Scherillo, 1919; and O. Bassi, 1934.

Pindus, range of mts in Greece, forming the boundary between Thessaly and Epirus. Greatest height, 7665 ft. In the Second World War the Brit. forces fought Ger. and It. forces in the P. gorges in Nov. 1940.

Pine (*Pinus*), large and important genus of coniferous trees. The only Brit. native is the Scottish P. (*P. sylvestris*), a beautiful tree which grows well upon deep, loose, sandy soil. Other P.s grown for profit in Britain are the Corsican (*P. laricio*), Austrian (*P. austriaca*), and Weymouth (*P. strobus*). Except in the coldest parts of Britain, the Corsican P. outgrows the Scottish P. both in height and girth, and can bear a greater degree of shade, while of all conifers it is least attacked by rabbits. The Austrian P. is sometimes planted on poor limy soil. The pitch P., a native of S. N. America, and perhaps the most valuable of all P.s, is too tender for the Brit. climate; besides its valuable well-known timber, it yields turpentine, pitch, tar, and resin. The Banksian P. thrives on the poorest soil,

and has been largely planted in Germany. The stone or parasol P. is cultivated in Italy for its large edible seeds. Another Mediterranean species, the cluster or maritime P. (*P. pinaster*), is extensively planted on sand dunes, which it binds together with its roots, acting also as a valuable wind break.

Pine Bluff, city in Jefferson co., Arkansas, U.S.A., on the Arkansas R., 40 m. SSE. of Little Rock; it has cotton and lumber mills and iron works, and is the seat of Arkansas Agric., Mechanical, and Normal College for Negroes. U.S. Pine Bluff Arsenal is near. Pop. 37,000.

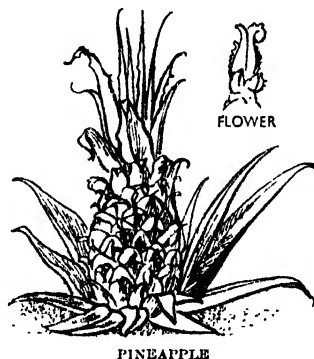
Pine Marten, *Martes martes*, member of the weasel and badger family, *Mustelidae*, distributed over the Old World, but now rare in Britain. The body is long and lithe, about 18 in., with a tail of about 12 in. The legs are short; the paws have 5 digits armed with claws. The fur is dark brown, lighter on cheeks and on the sharp snout; the throat and under side of neck are yellow. It is arboreal, and frequents coniferous woods, whence its popular name.

Pine Tree Flag, flag having a white field with a device in green of a pine-tree, first used by the Massachusetts colony in the early 18th cent., carried by the first vessels of the colonies in the Amer. Revolution.

'Pine Tree State,' see MAINE.

Pineal Gland, or **Pineal Body**, small reddish gland situated behind the third ventricle and connected with the optic thalami by 2 nervous structures called peduncles. The function of the pineal body is not known, but it is homologous with a rudimentary third or median eye found in certain lizards. Some physiologists regard it as a ductless gland, though there is no adequate evidence.

Pineapple (*Ananas comosus* varieties *sativus*), fruit of a Brazilian plant which is



easily grown in the stovehouse. The flowers, surmounted by a crown of spiny leaves, are borne on spikes which rise from the centre of the plant. There are numerous varieties of the fruit, and those of the

finest flavour are home grown, but the fruit now hardly pays for culture in Britain.

Pinel, Philippe (1745-1826), Fr. physician, b. Saint-André, and after a good classical education he studied medicine at Toulouse. Having applied himself with success to the study of mental alienation, he was charged, in 1791, to make a report on the insane inmates of the Bicêtre, became chief physician of this institution in 1793, and in 1795 was chosen to the same office at the Salpêtrière (asylum for females). P. gained fame by his introduction of humane methods of treating the insane. His chief scientific work was his system of disease classification.

Pinene, chief constituent of turpentine, is a hydrocarbon of the formula $C_{10}H_{16}$. It is a colourless mobile liquid (boiling point $156^{\circ}C$, sp. gr. 0.86). It occurs in pine-trees and also in many essential oils (e.g. those of laurel, lemon, and sage). Like ethylene, it forms a crystalline dibromide, and also forms other additive compounds, such as P. hydrochloride and P. nitroso-chloride. It readily oxidises, yielding various products, including terephthalic acid, terpenylic acid, etc. It is a useful solvent for resins.

Pinero, Sir Arthur Wing (1855-1934), playwright, b. Islington. Trained for the law, he gave this up to be an actor. He went on the stage in 1874 and acted with Sir Henry Irving and others until 1881, when he retired and devoted himself exclusively to play-writing. His earlier plays were farces and comedies, in which the author often satirised the follies and fads of the day. Among these plays, which almost without exception were successful, were *The Magistrate*, 1885, *The Schoolmistress*, 1886, *The Hobby Horse*, 1886, *Sweet Lavender*, which had a very long run with Edward Terry as Dick Phenyl, 1888, *The Profligate*, 1889, *The Weaker Sex*, 1889, *The Cabinet Minister*, 1890, and *The Times*, 1891. In *The Second Mrs Tanqueray*, 1893, P. took a more serious subject, his treatment of which was no doubt influenced by the growing vogue of Ibsen. Encouraged by the success of this 'problem play,' P. frequently took subjects of considerable importance for his themes, and produced *The Notorious Mrs Elphinstone*, 1895, *Iris*, 1901, and *Lefty*, 1903. A play of P.'s that pleased people not often pleased by him was *Trelawny of the Wells*, 1898. In it Irene Vanbrugh made her reputation, repeating her success in P.'s *The Gay Lord Quex*, 1899. *A Wife Without a Smile*, 1904, was not popular. *Mid-Channel*, 1909, was hailed as a masterpiece by Wm Archer, to the astonishment of many. P. always excelled in construction; indeed the neatness of his finish betrays the Ibsen influence. He was knighted in 1909. See H. Fyfe, *Sir Arthur Pinero's Plays and Players*, 1930, and a life by W. D. Dunkel, 1943.

Pinerolo (Fr. Pignerol), It. tn, in Piedmont (q.v.), in the Chisone valley 22 m. SW. of Turin (q.v.). In the 14th cent. it was the most important tn in Piedmont.

The cathedral is partly 11th cent., and there is a citadel where Nicolas Fouquet and the Man in the Iron Mask (q.v.) were imprisoned. Nails are manuf., the butter and honey of P. are noted, and there are talc and graphite deposits. The cavalry school of P. is well known. Pop. (tn) 15,400; (com.) 21,600.

Pines, Isle of, is. dependency of New Caledonia, a Fr. Pacific colony. It is 30 m. SE. of New Caledonia, has an area of 58 sq. m., and a pop. of about 600.

Ping Pong, see TABLE TENNIS.

Pinguloula, see BUTTERWORT.

Pink, see CARNATION; DIANTHUS.

Pink Eye, see CONJUNCTIVA.

Pink-root, or **Indian Pink** (*Spigelia marilandica*), species of Loganiaceae which grows in America. The roots have anthelmintic properties. It is also known as Wormgrass.

'Pink 'Un', see 'SPORTING TIMES.'

Pinkerton, Allan (1819-84), Amer. detective, b. Glasgow, Scotland. He emigrated to Chicago, where he estab. the agency which bears his name. He was appointed to the U.S. secret service in 1861, and was prominent in many celebrated cases, assisting in breaking up the 'Molly Maguires.' Later he was employed as special detective on the great Amer. railways. He pub. sev. detective stories in which his exploits were narrated. See R. W. Rowan, *The Pinkertons*, 1931.

Pinkerton, John (1758-1826), historian, b. Edinburgh. After publishing some collections of ballads (including, as he later admitted, sev. which were forged) he turned to historical studies. Among his works is *The History of Scotland from the Accession of the House of Stuart to that of Mary*, 1797.

Pinkie, locality near Musselburgh, Midlothian, Scotland, the scene of the defeat of 28,000 Scots, under the Regent Arran, by half the number of English, under the Protector Somerset, 10 Sept. 1547. P. House was built in the 15th cent. Its reconstruction by Alexander Seton in 1613 exemplifies the anglicising of Scottish architecture resulting from the union of the Crowns. In the reconstruction the growing influence of the Renaissance is evident. The painted gallery is noteworthy, being decorated in the early 17th cent.

Pinking, see KNOCKING.

Pinna, genus of enulamollibranchiate molluscs; the species are popularly termed wing-shells. Some species attain a length of about 2 ft. and the long, delicate byssus is sometimes woven into cloth or made into gloves and bracelets.

Pinnace, formerly a small 2-masted vessel, fully rigged, and employed as tender to large ships. In the Brit. Navy the term is applied to an 8-oared boat larger than a cutter and provided with sails. All Brit. men-of-war now carry motor P.s.

Pinnacle, in Gothic architecture, a pyramidal or conical feature, often richly carved; and commonly crowning a buttress, when it serves a structural purpose because its weight helps to counteract the outward thrust of a vault or roof-truss.

Pinos, Isla de, is. resort in the W. Indies, 37 m. S. of Cuba, of which it is a dependency; it has marble quarries, and produces fruit, cattle, tobacco, sulphur, turpentine, and tortoiseshell. It was discovered by Columbus in 1494, and was long notorious as a pirate stronghold. It was regarded as a part of Cuba by the U.S.A., who relinquished their claim to it under the Platt Amendment, in a treaty signed in 1925. Santa Fé is the cap., and has mineral springs. Vegetables and grapefruit are cultivated. Area 1180 sq. m. Pop. 10,000.

Pins. The earliest P. were doubtless thorns. Bone P. and bronze P. have been found dating from prehistoric times. Some of these old P. have ornamental beads, others are shaped like hairpins, and some of the 'safety' type have been found. In 1483 the importation of P. into England was forbidden, but until 1626, when John Tilsby started the manu. of P. at Stroud, most of the P. used in England were obtained from France. The London Pinmakers' Corporation dates from 1636. The chief centre of the trade is Birmingham. The machine patented by Wright in 1824, apparently on the lines of Seth Hunt's patent in 1817, revolutionised the pin industry when improved by Shuttleworth and Tyler. The old form of pin had the head made separately from the shank, attached thereto by wire. In the manu. of the present solid-headed P. wire of a suitable gauge runs off a reel, and is nipped between lateral jaws at the required point. It is headed by a die, and pointed by a revolving cutter, at the rate of 360 per min. Brass P. are 'boiled white' with a solution of oxalic acid, argol, water, and alternate layers of grain tin after being scoured in barrels with the solution from the boiling white of the previous load, with the addition of fuller's earth. Iron P. are scoured in a weak solution of cyanide, potash, and water, then electro-plated with copper. Brass and iron P. are washed, dried, and polished in sawdust. Mourning P. are dipped in black japan, then baked. Safety P. are also made by machinery.

Pinsk, tn in Brest Oblast of Belorussia, on R. Pripet. It has wood-working industries. Known since 1097, in the 13th cent. it was the cap. of P. principality, in the 14th cent. Lithuanian, 1569-1793 and 1920-39 Polish, 1793-1920 Russian. 1939-54 cap. of P. Oblast, now abolished. Pop. (1939) 25,000 (c. 1914, 37,000).

Pint, see METROLOGY.

Pintail Duck, or Sea-pheasant (*Anas acuta*), handsome wild duck with a long tail, the 2 middle feathers of which in the male taper to a sharp point, projecting some 5 in. beyond the others. The head is brown, the upper parts dark grey, with narrow black stripes, and the under parts white. It breeds in Scotland and Ireland, and visits the E. coast of England in the winter, where, when domesticated, it readily pairs with other ducks. Its migratory range is very extensive.

Pinto, Fernão Mendez (1509-83), Portuguese adventurer, b. Montemor-o-Velho.

In 1537 he set out to try his fortunes in the E., and travelled for 21 years in SE. Asia, fighting and trading in China, Tartary, and the neighbouring countries, and going on a special mission to Japan in 1542-3. He was the friend and travelling companion of St Francis Xavier (q.v.). In 1558 he gave up his wanderings and returned to Portugal, where he married and wrote his famous book, *Il Peregrinação*, pub. in Madrid in 1614. There is an abridged and illustrated trans. by Arminius Vanbery, 1891, and *Portuguese Voyages, 1498-1663*, ed. by C. D. Ley (Everyman's Library), contains a long extract from P.'s book. See life by M. Collis, 1949.

Pinto, Serpa, see SERPA PINTO.

Pintoricchio (or Pinturicchio), Bernardino, or Bernardino di Botto (1454-1513), It. painter, b. Perugia. He assisted Perugino with his frescoes in the Sistine Chapel, and was engaged by various members of the Rom. nobility to decorate their palaces. He also decorated a whole series of chapels in the church of S. Maria del Popolo in Rome. The most striking of his frescoes are those in the cathedral library at Siena, representing the hist. of Pope Pius II. The gaiety and charm of P.'s work can be appreciated from his 'The Return of Odysseus' (National Gallery). See G. B. Vermiglioli, *Memorie di Pinturicchio*, 1837; Schmarov, *Pinturicchio in Rome*, 1882; C. Ricchi, *Pinturicchio*, 1902; and life by W. Bombe, 1912.

Pinwell, George John (1842-75), water-colour painter and black-and-white artist, b. High Wycombe. He was one of the most successful book illustrators of his day. His best and chief productions included illustrations of Goldsmith, Jean Ingelow's poems, the *Arabian Nights*, etc. His prin. water-colour paintings are 2 scenes from 'The Pied Piper of Hamelin', 'The Elixir of Life', and 'A Seat in St James's Park.' See life by G. C. Williamson, 1900.

Pinzon, Martin Alonso (c. 1440-93), Sp. navigator, companion of Columbus, in whose first expedition (1492) he commanded the *Pinta*. After their landing at San Salvador (Watling Is.) he separated from Columbus for a time, and discovered Haiti, returning to Palo in Andalusia on the same day as Columbus, of whose success he was said to be envious (see F. Asensio, *Estudio histórico*, 1892). He was the first Sp. navigator to cross the equator (1499-1500), discovering Brazil and the mouth of the Amazon. With Solís (1506) he explored the Gulf of Honduras and SE. Yucatan and the E. of S. America (1508). See C. F. Duro, *Colon e Pinzon*, 1885.

Piombino: 1. It. tn, in Tuscany (q.v.), once the cap. of a principality. It is on a peninsula in the Ligurian Sea (q.v.), and is the nearest point on the mainland to Elba (q.v.). The tn has a 14th-cent. church, and the remains of the ant. Populonia are near by. There is an iron and steel industry deriving from the mines of Elba. Pop. (tn) 28,500; (com.) 32,300.

2. Former principality in NW. Italy, now part of the prov. of Leghorn in Tuscany (q.v.). It belonged to the Applanò (q.v.) family, 1399-1603. In 1801 it was ceded to France, and in 1805 Napoleon gave it to his sister, Marianne Bacciocchi (q.v.). In 1815 it was joined to Tuscany.

Piombino, Strait of, see ELBA.

Piombo, see SEBASTIANO DEL PIOMBO.

Pioneer (military) (Fr. *pionnier*, foot-soldier). Formerly, in war, the P. was one of a body of foot soldiers, generally in the ratio of 10 to every battalion, who marched in advance with pickaxes, spades, and other tools to prepare the road or remove obstructions for the main body of the troops or to do other minor engineering or constructive work. P. regiments have formed part of the Indian Army for many years. A Brit. Army P. Corps was raised in 1939 (see below).

Pioneer Association, see MATHEW, THEOBALD.

Pioneer Corps, Royal. The term 'pioneer' is a fairly ancient one in Eng. military phraseology, where it is more or less interchangeable with the modern Eng. term 'engineer' in its military sense of 'sapper and miner'. In many foreign armies (e.g. Ger.) troops which in England are called engineers are called pioneers. The employment of pioneers was not only in siege warfare but on the move on lines of communication, where their task was to build and maintain roads and bridges. This task was sometimes entrusted to second-line infantry (elderly, slightly unfit, or lightly armed troops), and from 1914 to 1918 every Brit. div. had a battalion of such troops, which was raised from an infantry depot, permanently employed in digging and repairing trenches in rear of the main defence system; hence their generic name of 'navvy battalions.' Work on roads and bridges was mainly entrusted to labour battalions and companies often of colonial or Asiatic origin, e.g. the Chinese Labour Corps. In Oct. 1939 about 50 labour companies existed and were formed into the Auxiliary Military Pioneer Corps, which became the Pioneer Corps in 1940 and the Royal Pioneer Corps in 1946. By the end of the war the corps had a strength of over 250,000, including such diverse elements as cobelligerent Italians and companies of Brit. subjects from Mauritius and native companies from Bechuanaland, Basutoland, Swaziland, and Zululand.

Other pioneers in the older military sense, forming part of regiments of infantry and engaged in clearing the way for the advancing troops, are now represented by the pioneer platoon of the support company in an infantry battalion, whose prin. task is to remove or disarm wire and mines in the assault or pursuit.

Pioneer Health Centre, see PECKHAM EXPERIMENT.

Piotrkow, or Piotrkow Trybunalski, tn of Poland, in Łódź prov., 28 m. SSE of Łódź (q.v.). It dates from the 12th cent., and was the scene of sev. diets in the Middle Ages. There are textile, chemical,

machinery, and glass industries. Pop. 40,200.

Piozzi, Hester Lynch, earlier Thrale (1741-1821), authoress, b. Bodvel, Caernarvonshire, daughter of John Salusbury of Flintshire. She married in 1763 Henry Thrale (q.v.), and soon after became an intimate friend of Dr Johnson, who frequently stayed at the Thrales' house at Streatham, and travelled with them. Thrale d. in 1781, and 3 years later the widow married Gabriel P., a musician. She wrote in 1786 *Anecdotes of the late Samuel Johnson, LL.D.*, and 2 years later pub. her correspondence with the great man. She also wrote *The Three Warnings*, 1766, a poem which is said to have been partly Dr Johnson's work. *Thraliana*, 1842, contains her diaries and notebooks from 1776 to 1809. See O. G. Knapp (ed.), *The Intimate Letters of Hester Piozzi to Penelope Pennington, 1782-1821*, 1913, and C. E. Vulliamy, *Mrs Thrale of Streatham*, 1936.

Pipa, Pipa, or Surinam Toad, large, tongueless toad, the only representative of its genus and family, and peculiar to Dutch Guiana. Its most remarkable feature is the hatching of the eggs each in a small pouch on the back of the female, where they are placed by the male, and adhere by a glutinous secretion, gradually becoming imbedded in the epidermis. The eggs are hatched and the metamorphosis of the young is completed before they escape. The toad's head is broad and pointed and the body is brownish-olive.

Pipal, or Popul, see BO-TREE.

Pipe (measure), see METROLOGY.

Pipe (music), cylindrical instrument with holes through which air passes, making musical sounds. In this, its simplest form, it is probably the oldest of all musical instruments. Such is the P. of Gk art and song, and from it later varieties have been evolved, one being the bagpipes. In England the morris dance was accompanied by P. and tabor. The P. had 3 holes, 2 in front for the first 2 fingers and 1 at the back for the thumb; the player held the P. in the left hand and, with his right, beat the tabor suspended from his left wrist. All wind instruments, including the organ, are 'pipes.' They may be classified into reed (q.v.) P.s, such as the clarinet, oboe; whistle P.s, such as panpipes (see under ORGAN and also PANPIPES); and P.s with cup mouth-pieces, such as the trumpet. Organ P.s may be stopped, open, reed, or flute (see ORGAN).

Pipe (tobacco). Tubes and primitive P.s for smoking tobacco, as distinct from other plants, were invented in the Americas before the time of Columbus, specimens having been found in ancient Indian mounds. P.s and tobacco were brought to England by sea captains and colonists in the time of Hawkins and Drake, and the practice of smoking estab. itself between 1665 and 1690. Sir Walter Raleigh, who perfected a method of curing the leaf, helped to popularise smoking among the courtiers of his day, and a guild of P.

makers had been formed in London by 1610.

P.s have been made from many materials, including pipe-clay (q.v.), meerschaum (q.v.), glass, metals, and briar-root. Briar-root, a species of heather which grows in Mediterranean countries, is the finest known material, because it is tough, light, heat resistant, and yet absorbs the tobacco tars produced by smoking.

P.s for smoking herbs for medicinal and other purposes were known in Europe, Asia, and Africa in ancient times. Coltsfoot, yarrow, hempseed, and other plants were smoked in P.s. Primitive P.s have been made from a stick of elder, from which the pith has been removed, from crabs' claws, from hollowed-out stones, and even from the earth itself.

The earliest Elizabethan fairy or elfin P.s have a barrel-shaped bowl leaning forwards, a flat heel and a 12-in. stem. Because of the high cost of tobacco a spur on the base of the bowl took the place of a flat heel, and it was Broseley that supplied many of the 'fancy' clays with mouldings in relief. Churchwardens and long-stemmed London Straws, with spurs which prevented the hot bowl from touching the table, were more suited to the leisured life of London coffee houses and clubs.

The Scottish *cutty* P. and Irish *dudeen* are short clay P.s. The most celebrated seat of clay-P. manuf. in Britain is Broseley, in Shropshire, where it appears to have been estab. in the middle of the 16th cent. P.s are, however, made in many places, the clay being obtained chiefly in Cornwall. The P.-makers of London, as early as 1601, had privileges which gave them a monopoly. In 1619 the craft of P.-makers was incorporated in England. Holland has long been famous for P.-making. See W. Bragge, *A Catalogue of Pipes*, 1880, and A. Dunhill, *Pipe Book*, 1924; and A. H. Dunhill, *The Gentle Art of Smoking*, 1954.

Pipe-clay, white, friable clay used for making clay pipes. It is similar in many respects to the clay used in the manuf. of china, and consists mainly of kaolin, particles of quartz, and partly decomposed felspar; it is usually free from alkalis. The clay is found chiefly in Cornwall and Dorset, and is still made into pipes at Broseley in Shropshire.

Pipe Roll, Great Roll of the Exchequer, now kept in the Record Office, London. The accounts of the revenue collected by the sheriffs are contained in it, and these were known as pipes. The first extant P. R. dates from the early 12th cent. P. R.s contained valuable information on subjects connected with national finance and revenue. See also PUBLIC RECORD OFFICE.

Pipefish, name for sev. elongated fish of the family Syngnathidae, with small gill opening and a single dorsal but no pelvic fins. The snout is prolonged into a tube, and the mouth is toothless. They are small marine fish, poor swimmers, and live near the coast in temperate and

tropical regions. The eggs of some species are carried by the male in a brood pouch on the abdomen or the tail; in others they are embedded in the soft skin of the abdomen.

Pipeline, line or conduit of pipe sometimes many hundreds of miles long, by which oil is conveyed from an oil region to a market or to reservoirs for refining; also a line for carrying compressed air, or water (for domestic, industrial, or fire-fighting purposes), or in gas, or natural gas, or sewage, etc., or a line for conveying power from a hydro-electric installation. Water supplies have been piped over long distances since the earliest times. Bamboo P.s were built by the Chinese about 5000 BC, and clay or stone P.s were widely used in Assyrian, Egyptian, Greek and Roman civilisation. A long-distance P. across the desert was constructed out of ox-hides sewn together to supply water to the army of King Cambyses of Persia when he invaded Egypt in 525 BC.

Modern oil P.s are of three kinds. Lines used for carrying oil from wellheads to field storage tanks are known as 'flow' lines. 'Gathering' lines then transport it to a field gathering point from which the collected production of the oilfield is piped in a 'trunk' line direct to a refinery or to a water terminal for onward transportation by tanker. Other trunk lines are used for carrying refined products from refineries to centres of distribution. A wooden P. for crude oil was constructed in the U.S.A. as early as 1861. This material proved unsuitable, however, and the first successful line was built of cast iron in Pennsylvania in 1865. This was a 2-in. gathering line 6 m. in length, with a throughput of some 250 tons a day. The first trunk line was built in 1874 to carry crude oil from the Pennsylvanian fields to Pittsburgh, 60 m. away. Another important early trunk line was that laid in 1897 for the transportation of kerosene from Baku to Batum on the Black Sea. This was a 4-in. line 117 m. long, delivering about 230 tons a day. Since that time many thousands of trunk lines have been laid, and by 1955 the world's total oil P. mileage (excluding the Soviet group of countries) was nearly 140,000, of which some 115,000 were in the U.S.A. In addition there were more than 150,000 m. of lines (some of them former oil lines) carrying natural gas, of which over 140,000 m. were in the U.S.A. Two famous oil P.s, now used for natural gas, the 'Big Inch' and 'Little Inch' lines, were built during the Second World War to carry crude oil and refined products respectively from the Texas fields to the neighbourhood of New York. The former is 24 in. in diameter and 1254 m. long, and had a capacity of more than 40,000 tons of oil a day. The latter is 20 in. in diameter and 1475 m. long. Among the most important of modern P.s is that known as 'Tapline', 30-31 in. in diameter and 1068 m. long, which connects the Saudi Arabian oilfields near Abqaiq with the port of Sidon in Lebanon, passing

through Jordan and Syria en route. This line, completed in 1950 at a cost of some \$80 million, has a throughput of nearly 44,000 tons a day, and renders unnecessary a sea journey of over 3000 m. through the Suez Canal. Another interesting line was the 'PLUTO' (Pipe Line under the Ocean) system of cross-channel lines which were laid to maintain supplies of gasoline to the Allies during the invasion of Europe in 1944. For laying, the lines were wound on huge floating drums, shaped something like a cotton reel, being 40 ft. in diameter and

threaded couplings for pipe sections were developed, but it was not until the Second World War that modern techniques made the introduction of high-strength seamless electrically welded pipe possible. To-day lines are constructed from butt-welded pipe sections 30-40 ft in length. A modern trunk P. should be capable of withstanding approximately 1200-lb. operating pressure.

P.s are normally buried in agric. country deep enough to avoid interference with crops, and in cold climates below the frost line. Pipelaying is highly mechanised, almost all stages of excavation, handling, welding and the application of protective coatings being performed by specialised machinery and vehicles.

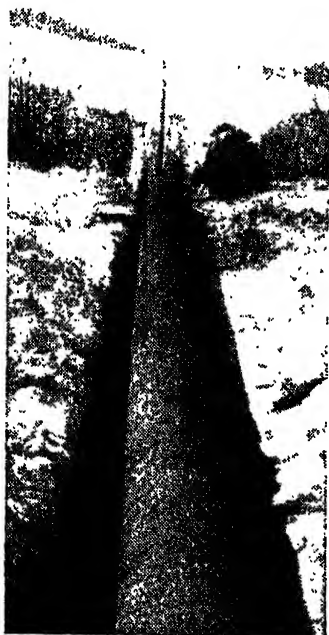
Oil sometimes flows through a P. by the force of gravity, but more usually has to be pumped by electric, steam, diesel or turbine engines located at intervals along the line. In the case of oil products such as bitumen and even some crude oils of high viscosity, heating is sometimes necessary to keep the contents of the P. fluid enough for pumping rates to be maintained. Crude oil produced at the San Joaquin fields, California, for example, sometimes requires temps. as high as 180° K. In order to measure quantities, detect leakages, and to identify the interface where different oil products are pumped consecutively without a segregating plug, elaborate systems of automatic control and intercommunication between terminals and pumping stations are necessary.

The protection of P.s externally and internally against corrosion and rusting is of the utmost importance. Externally coatings of bitumen are applied together in some cases with layers of bituminised felt or glass fibre. In addition, protection against corrosion of an electro-chemical nature is provided by causing a current of electricity to flow along the pipe, counteracting a corrosive current passing from the pipe to the surrounding soil. Internally rust and scale can be inhibited by the addition of certain chemicals to the oil, or removed by passing scrapers through the P. With careful maintenance a P. may have a life of 25 years and more.

Piper, John (1903-), painter and writer, b. Epsom, and educ. at Epsom College and the Royal College of Art. His water-colours and striking aquatints of architectural subjects made him famous. During the Second World War he painted the ruins of the House of Commons, and in 1941-2 did a series of water-colours of Windsor Castle, at the request of H.M. the Queen. P. has also designed *décor*s and illustrated books. Pubs. include *Brighton Aquatints*, 1939, and *British Romantic Painters*, 1942.

Piper, family Piperaceae, genus of tropical shrubs, of which *P. hille*, Betle Pepper, the sources of the betel leaf chewed by natives of S. Asia, and *P. nigrum*, Black or Common Pepper, are important.

Piperaceae, Pepperworts, family of over 1000 shrubs or herbs with small flowers in



New York Times Photos
OIL PIPELINE IN PENNSYLVANIA

60 ft. long. Each was then towed by a tug, the drum resting on the water and paying out the line as it went.

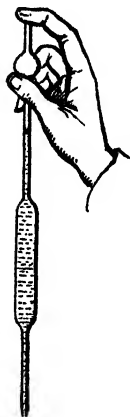
After the end of the 19th cent. steel came to be the standard material for P. construction instead of cast or wrought iron. Various types of joints and

spikes which are followed by somewhat fleshy fruits. Chief genera are *Peperomia* and *Piper* (q.v.).

Piperidine, basic liquid (boiling point 106°C .) of the formula $\text{C}_4\text{H}_9\text{N}$. It is prepared by reducing pyridine (q.v.) with sodium and alcohol.

Piperine, alkaloid of the formula $\text{C}_{17}\text{H}_{15}\text{O}_3\text{N}$. It occurs in pepper, and was synthesised chemically in 1882. P. forms white crystals; melting point 128.5°C .

Pipettes, glass tubes drawn to a point at



PIPETTE

one end and usually provided with a bulb. They are graduated to deliver specified volumes of liquids. In order to fill a pipette the liquid is sucked up until it reaches above the graduation mark on the stem, and the finger is then placed on the upper end. By gradually releasing the pressure the level of the liquid is allowed to fall until coincident with the graduation mark. On emptying the pipette the last drops are drained off against the side of the containing vessel. Actually the last drop cannot be removed by this process, but this is allowed for in the graduation of the pipette.

Piping Crow, or Australian Magpie (*Gymnorhina*), comprising 3 species, which occur only in the Australian region. Their plumage is black and white.

They are skilful mimics and can be taught to whistle tunes, hence the Australian name 'Flute Player.' Their diet is entirely of insects. *G. tibicen* is common in New S. Wales, and is frequently kept as a pet.

Piping-hare, see PIKA.

Pipit (*Anthus*), genus of passerine birds characterised by a slender soberly coloured body and a notched and fairly long beak. The meadow P. or titlark (*A. pratensis*) is the commonest Brit. species. It is the chief victim of the cuckoo's habit of finding a foster-mother for its eggs. Other Brit. species are the tree P. (*A. trivialis*) and the rock P. (*A. petrosus*). The genus was formerly comprised in the genus *Alauda*, which includes the woodlark and skylark, but is now placed with the wagtails in a separate family, Motacillidae.

Pippi de' Giannuzzi, see GIULIO ROMANO.

Pippin, see PEPIN.

Pipridae, see MANAKINS.

Piqua, city of Ohio, U.S.A., on Great Miami R. 26 m. N. of Dayton. It has stone quarries and manufs. fabrics, machinery, and tools. Pop. 17,500.

Piqué, one of many forms of cotton fabric, used for making white dress shirts, shirt fronts, white waistcoats, and dress goods. Brit. weft fabrics are known as

P., having distinct cords or welts running width-wise. Amer. carded or combed yarn fabrics are warp P.s with narrow raised cords or wales running warp-wise. If there is a very narrow cord it is termed pin wale. Better qualities have additional coarser warp ends woven along back under each cord to help raise it. Fancy P.s are compound fabrics with quilted or puffed designs, also known as vestings.

Piquet, long-estab. card game, in a sense the aristocrat of card games for two. Its polished technique and Fr. terminology bear witness to its courtly origin. It is played with a pack of 32 cards, all below the sevens being removed. The cards used rank in the whist order. The

Younger Hand must deal the cards out either by 2s or 3s until each has 12. The remaining 8 are called the stock. The object of the game formerly was to score 100 points before one's adversary, but since the introduction of the *Rubicon* game, no precise number of points constitutes a game; but the players play 6 deals or a 'partie', the winner of the partie deducting the loser's score from his own, and adding 100. If, however, the loser fails to score 100, the winner adds the loser's score to his own prior to adding the 100. In this case the player who loses is said to be 'rubiconed,' i.e. has failed to cross the Rubicon. The scoring is by certain combinations, there being 3 possible scoring combinations, viz. (1) the *point*, i.e. the most of one suit; (2) the *sequence*, i.e. the greatest number of consecutives, not less than 3, of the same suit, or the *best* sequence if both players have an equal number; (3) the *quatorze* or *trio*, i.e. 4 aces, 4 kings, 4 queens, or 4 tens, or 3 of each. The *point* combination counts 1 for each card of the suit; if the players be equal, the scoring is by pips, the ace counting 11, the court cards 10 each. A *sequence* of 3 cards of any kind ('tierce') scores 3, of 4 cards ('quart') 4, beyond which 10 is added, i.e. 5 cards ('quint') score 15, 6 ('sixième') 16, and so on up to 8. Of 2 sequences, the longer is always the better, e.g. knave, ten, nine, eight are better than ace, king, and queen. As in *point*, if the best sequences are equal, neither player scores. A *quatorze* scores 14, and a *trio* 3; a *quatorze* of any kind necessarily destroys a *trio* of any kind. Each player after the deal has a right to reject some of his cards and take others from the 'talon' stock, Elder Hand (i.e. the non-dealer) having the right to begin. He must discard at least 1, and may discard as many as 5. The dealer in his turn must discard 1, and may, if he choose, take all or any of those that remain. The actual play follows the ordinary rules of whist, i.e. the scoring is by tricks. Elder Hand begins the play, the dealer, prior to putting his card down, declaring his scoring combination. The scoring of the *play* is thus: the first player

to every trick counts 1, but if the other wins the trick, the latter also counts 1, and the player who takes the last trick scores an extra 1 for it. A player who wins more than 6 tricks scores 10 'for the cards'; if both win 6 tricks there is no score 'for the cards' on either side. Additional scores for extraordinary cases are: (1) *Carte blanche*, when a player who is dealt a hand without king, queen, or knave may claim 10; (2) *Repique*, when a player scores 30 in hand where his opponent has not scored at all, 60 extra; (3) *P.*, when Elder Hand scores 30 extra, having scored 30 in hand and play where Younger Hand has nothing to declare and has not claimed equality in point of sequence; and (4) *Capot*, when a player winning all 12 tricks scores 40 instead of 10 for the cards.

Piracy. In its essentials *P.* by international law (q.v.) does not differ from *P.* according to the municipal law of any individual civilised nation. Writers on international law define *P.* as consisting in depredations on the seas not authorised by any sovereign state, and differentiate 'acts of hostility' from piratical acts. Where nations are at war with each other, robbery or other depredations committed by subjects of one warring nation against or on those of its enemy would be merely hostile acts; but if the person injured and the person inflicting the injury are either subjects of nations at peace with each other or of one and the same state, the injury amounts to *P.*, and is recognised by all civilised nations as an act punishable by the courts and under the laws of the injured person's state. In short, the essence of *P.* is 'the pursuit of private as contrasted with public ends,' and a pirate or sea-rover is primarily 'a man who satisfies his personal greed or his personal vengeance by robbery or murder in places beyond the jurisdiction of a state.' By the Eng. common law, *P.* is taken to include all those acts of robbery and depredation upon the high seas which, if committed upon land, would be classified as felonies (see CRIMINAL LAW). But a number of other acts, really amplifications of the underlying principle of *P. jure gentium*, have been made *P.* by various statutes passed in 1670, 1698, 1717, 1721, and 1744. Statutory *P.* includes, *inter alia*, the following acts: the voluntary cession by a commander, master, or seaman of his ship or cargo to a pirate; rendering assistance to a pirate; the running away by a commander, master, or seaman with a ship or cargo; boarding a merchantman and destroying the cargo; the rendering assistance to the enemy on the sea by a natural-born Brit. subject, or the commission by such a person against another Brit. subject of an act of hostility under the pretext of a commission from a foreign power; and generally having dealings with a pirate. The punishment was formerly death, but is now imprisonment. But capital punishment might still be inflicted for *P.* accompanied by either an assault with intent to murder or by any act endangering life. Notable

pirates of this period were (q.v.) of N. Africa, and the successors of the buccaneers (q.v.) on the Sp. Main (see also KIDD, WILLIAM). Except perhaps in Chinese waters, *P.* is practically unknown in modern times.

Piræus (Peiræus), tn of Attica, Greece, the seaport of Athens since about 485 BC, an important port and harbour both in ant. and modern times. Themistocles recognised its superiority to Phalerum and persuaded his countrymen to fortify it after the Persian wars, and connect it with Athens (about 5 m. NW.) by the famous 'Long Walls.' Cimon and Pericles in the 5th cent. BC carried out the plan of Themistocles. It had 3 harbours, the largest being W. of the peninsula on which the tn stood, and was the abode chiefly of the democratic Athenian pop. and of foreigners. Munychia to the S. was the Acropolis of the *P.*, on a hill now called Castella. The fortifications were destroyed (404 BC) after the Peloponnesian war, but restored in 393. Sulla destroyed them again (86 BC), and from that time the tn sank into obscurity until 1834. It was then rebuilt with arsenal depots and a naval and military school. A railway was constructed (1869) connecting it with Athens. It is the second largest city in Greece, by far the largest port, the chief port of entry for imports, and the chief industrial centre. Marble from the quarries of Pentellicus, Scyros, and Tenos, olives, and oil are exported. Cottons, silk, paper, machinery, iron, macaroni, and flour are manufactured, and there are tanneries, distilleries, and shipbuilding yards. Coal, railway plant, petroleum, and cattle are among the chief imports. In the Second World War it was bombed by It. aircraft (Jan. 1941) and later, when in Ger. occupation, Brit. aircraft bombed its military installations. Pop. 184,800. See further under ATHENS. See W. M. Leake, *Topography of Athens*, 1841.

Piran (Kiran), Saint, see PERRANZA-BULOE.

Piran, seaport in the Yugoslav zone of the Territory of Trieste (q.v.), on a promontory on the S. side of the Gulf of Trieste, 13 m. SW. of Trieste city. It is an old Venetian tn, with ant. churches and other buildings. Pop. 14,000.

Pirandello, Luigi, (1867-1936), It. novelist and playwright, b. Girgenti, Sicily. He was educated at the univ. of Rome and afterwards at the univ. of Bonn. His first book, *Mal Gioconda* (poems), appeared in 1889, and during the next 30 years he produced novels and short stories, numbering some 400. Of his novels, *I fu Mattia Pascal*, 1904, had an originality which influenced It. fiction in the reaction against the romanticism of D'Annunzio. In 1910 *P.* began writing for the stage, turning many of his short stories into plays. It is as a dramatist that he earned a European reputation, both for the technical brilliance and originality of his method and for his metaphysical choice of subject. His recurrent theme was the dislocation of the personality under the

stress of circumstances, showing that character is not an absolute quality, but fluctuates between its inherited tendencies on the one side and the conditions of society on the other. His best-known plays are *Sei Personaggi in Cerca d'Autore* (or 'Six Characters in Search of an Author'), 1921; *Enrico Quarto*, 1922; and *Ciacuno a Suo Modo*, 1924. His complete plays were pub. in 1922 in 31 vols. Besides plays and stories he has written *L'Umorismo*, 1908, a study in humour. With literature P. combined the profession of teaching, and was a prof. at the Istituto Superiore di Magistero Femminile, a higher training school for women in Rome. P. was awarded the Nobel prize for literature in 1934. Eng. trans. *Sicilian Limes*, 1921; 3 plays: *Six Characters in Search of an Author*, *Henry IV*, and *Right You Are*, 1922; *Each in His Own Way*, and 2 other plays (*The Pleasure of Honesty and Naked*), 1923; *The Late Mattia Pascal*, 1923; *The Outcast*, 1925; *Shoot!*, *The Notebooks of Serafino Gubbio*, *Cinematograph Operator*, 1927; *Horse in the Moon*, 1932. See also W. Starkie, *Luigi Pirandello*, 1928, and *Luigi Pirandello and the Italian Drama*, 1937; F. Pasini, *Luigi Pirandello*, 1927; life by F. Palai, 1927; and D. Vittorini, *The Drama of Luigi Pirandello*, 1935.

Piranesi, Giovanni Battista (1720-78), It. engraver, b. Venice, and studied at Rome. He afterwards led a wandering life, and spent his time in architectural designs, in which branch of his art he excelled, his work being characterised by its freedom. The number of his designs is considerably over 1000. He also executed the repairs of and restored some churches under the orders of Clement XIII. To-day he is esteemed above all for his 'Carceri,' the amazing series of 'prison' etchings in which he gave his imagination free rein. See A. Samuel, *Piranesi: a Critical Study of His Life and Works*, 1910, and life by H. Focillon, 1928.

Pirano, see PIRAN.

Pirene (Peirene), fountain at Corinth, Greece. Rising in the Acrocorinthus (citadel), it was connected with other springs of the same name at the foot thereof and on the road from the Agora to Lechaëum (see Pausanias, II. 3-5; Strabo, VII. p. 379). It was here that Bellerophon caught Pegasus.

Pirenne, Henri (1862-1935), Belgian historian, b. Verviers. After having studied at the univs. of Liège, Paris, Leipzig, and Berlin he lectured at Liège in 1885 and was prof. at the univ. of Ghent from 1886 to 1930. He specialised in the hist. of the Middle Ages, and of particular interest are his works on the historical growth of the cities and their first economic and social aspects: *Histoire de la ville de Dinant au moyen âge*, 1889, *Les Anciennes Démocraties des Pays-Bas*, 1910, *Étapes de l'histoire sociale du capitalisme*, 1914, *Les Villes au moyen âge*, 1927. His main work, however, is a monumental *Histoire de Belgique*, 7 vols., 1900-32, in which predominates his thesis

that Belgium as a nation has had a vital place in the hist. of W. Europe.

Pirhe Aboth (i.e. Ethics of the Fathers), one of the treatises of the Jewish *Mishnah* (q.v.), a collection of representative sayings of anct rabbis dealing with ethical and religious matters.

Pirmasens, Ger. tn in the Land of Rhineland-Palatinate (q.v.), 62 m. SW. by S. of Mainz (q.v.). It is the centre of the Gor. boot and shoe manufacturing industry. Pop. 50,000.

Pirna, Ger. tn in the dist. of Dresden, on the Elbe, 11 m. SE. of Dresden (q.v.). It was the scene of the surrender of the Saxons to the Prussians during the Seven Years' War (q.v.). The tn is a health resort and has paper, textile, metal, and wood industries. Pop. 38,000.

Pirogoff, Nikolai Ivanovich (1801-81), Russian surgeon, b. Moscow, where he studied medicine at the univ. and qualified in 1818; studied for 2 years in Germany, taught at Dorpat for sev. years, and was then appointed prof. of surgery at the Medico-chirurgical Academy, St Petersburg, where he introduced important reforms in teaching. He served in sev. Russian campaigns, where he saw a great deal of military surgery; he was responsible for the introduction of female nursing of the Russian wounded in the Crimea. He was one of the first in Europe to employ anaesthetics, using ether as early as 1847, and he was the first to use rectal ether. He pub. (1852-9) a great atlas of 220 plates, in which frozen sections were for the first time used on a large scale in anatomical illustration; and he compiled a valuable treatise on military surgery (*Gründzüge der allgemeinen Kriegschirurgie*, 1864). He was one of the greatest military surgeons, and in Russian medicine he is approached in importance only by Pavlov.

Pirot (anct Turres), tn in Serbia, Yugoslavia, on the Nisava. It is the centre for the produce of the fertile plain of P., and has a celebrated anct carpet-making industry. Pop. 13,200.

Pir-Panjal, range of mts bounding Kashmir on the SW., and rising to a height of 15,000 ft.

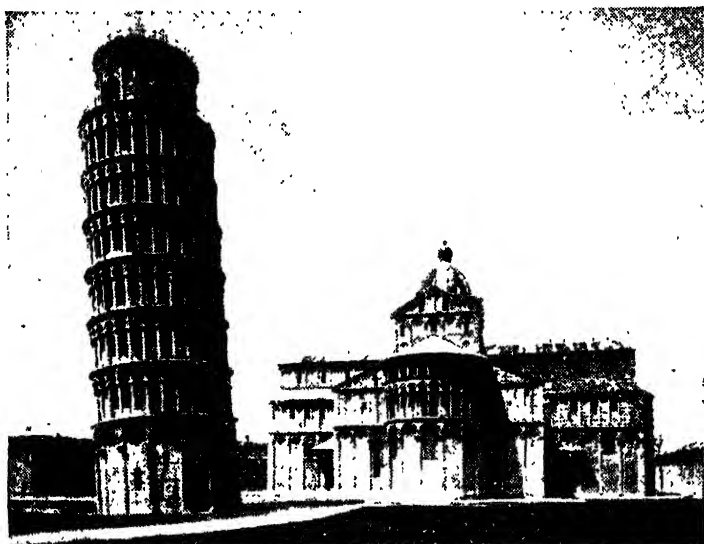
Pirquet von Cesenatico, Clemens Peter, freiherr (1874-1929), Austrian physician, b. Aspern. He studied medicine at Graz, where he qualified in 1900. After working in Vienna he became prof. of paediatrics successively at Johns Hopkins Univ., Baltimore (1908), Breslau (1910), and Vienna (1911). In 1907 he introduced the *Pirquet test*, a skin reaction for the diagnosis of tuberculosis. He pub. work of fundamental importance on allergy, a term which he himself suggested; his writings on this subject include *Die Serumkrankheit* (with B. Schick), 1905, *Klinische Studien über Vakzination und Allergie*, 1907. He also pub. *Allergie des Lebensalters, die bösartigen Geschwülste*, 1930, a study of the age and sex incidence of cancer.

Pisa: 1. Prov. of Italy, in NE. Tuscany (q.v.). It has a short coast-line in the NW. on the Ligurian Sea. The prov. is

mainly mountainous in the S. and E. and low-lying in the N. It is watered by the Arno (q.v.) and the Cecina. Cereals, oil, and wine are produced, and there are marble quarries and coal and copper mines. The prin. tns include P., Cascina, and Volterra (qq.v.). Area 965 sq. m. Pop. 354,000.

2. (anc. Julia Pisana or Julia Obsequens), It. city, cap. of the prov. of P., situated on both banks of the Arno, 42 m. W. of Florence (q.v.). Once subject to Rome, P. was a powerful and independent republic by the 11th cent., and included Corsica, Sardinia, and the Balearic Is. (qq.v.) in its

tistery in 1153) with its conical dome; the Campo Santo, a 13th-cent. burial place surrounded by a cloister, the walls of which are decorated with beautiful frescoes by Benozzo Gozzoli (q.v.) and others. Some of these frescoes were irreparably damaged during the fighting in P. in the Second World War (1944). P. has many other notable buildings, and has a univ. (1343) with an important library (1742), and a Higher Normal School (1813). The 17th-cent. Ponte di Mezzo, destroyed in the war, has been replaced by a modern bridge. P. has cotton manufs., and marble and ala-



W. F. Munsell

PISA: THE LEANING TOWER AND THE CATHEDRAL

dominions. The crushing defeat of the Pisan fleet by the Genoese fleet off Meloria (q.v.) in 1284 robbed P. of its power. In 1399 it came into the hands of the Visconti (q.v.), who sold it to Florence in 1405. A subsequent short-lived republic under Fr. protection was overthrown by the Florentines in 1409. Since the 16th cent. the pop. has declined considerably. The most famous of the magnificent buildings of P. are grouped together on the Piazza del Duomo in the N. of the city: the marble archiepiscopal cathedral (begun 1063), with its fine dome and façade, bronze doors, and the pulpit of Giovanni Pisano (q.v.); the Campanile, or 'Leaning Tower' (N. side 180 ft high; S. side 187 ft high; incline about 15 ft), begun in 1173, partly built when the foundation subsided, and completed c. 1350; the bap-

baster carving industries. Galileo (q.v.) was b. here. Pop. 83,700.

See ITALIAN ART; and see J. Schübring, *Pisa*, 1902; Janet Ross and Nollie Erichsen, *The Story of Pisa and Lucca*, 1902 (Medieval Towns Series); and J. de Foville, *Pise et Lucques*, 1914.

Pisagua, cap. of the dept. of P. in the prov. of Tarapacá, Chile, 45 m. N. of Iquique. It was once engaged in the shipping of nitrate of soda. Pop. 500.

Pisano, Christine de, see CHRISTINE. Pisano, Andrea (c. 1270-1349), It. sculptor, whose real name was Andrea de Pontedera, b. Pontedera, a pupil of Giovanni P. He settled in Florence and became famous as a worker in bronze and marble. P. executed the door of the baptistery in Florence and the bas-reliefs designed by Giotto for the lower storey

of the campanile. His 2 sons, Nino and Tommaso, were also sculptors of ability.

Pisano, Giovanni (c. 1240-c. 1328), It. sculptor and architect, son of Niccolò P., b. probably at Pisa. He worked with his father on the pulpit of Siena, and built the famous Campo Santo at Pisa and the shrine of San Donato at Arezzo.

Pisano, Niccolò (or Niccolia) (1206-78), It. sculptor and architect, b. Pisa. He built the Santa Trinita at Florence, the Santa Margherita at Cortona, the pulpit of the baptistery at Cortona, the pulpit of the cathedral at Siena. He and his son Giovanni (q.v.) were largely responsible for initiating the great revival and development of sculpture in Italy.

Pisano, Vittore (or Antonio), called **Pisanello** (c. 1395-1456), It. painter and greatest of It. medallists, b. San Vigilio, associated mainly with Verona, though he worked elsewhere. His delightful and popular 'Vision of St Eustace' (National Gallery) shows his exceptional sympathy for birds and animals, and his animal drawings are masterpieces of their kind. These and his medals are his main title to fame. He worked on medals for the court of Mantua (1439), and executed portraits of many of the princes of his time, including Leonello d'Este (1444). See G. F. Hill, *Pisanello*, 1905; *Drawings by Pisanello*, 1929.

Pisanus, see **LEONARDO OF PISA**.

Pisaurum, see **PSARO**.

Piscataqua, riv. formed by Salmon Falls and Cochecho R., and part of the boundary between New Hampshire and Maine, U.S.A. At its mouth is the harbour of Portsmouth.

Pisces, or the Fishes, twelfth and last sign of the Zodiac (q.v.), which the sun enters about 28 Feb. Its constellation consists of 2 fishes linked by a string attached to their tails. One is under the right arm of Andromeda, the other under the wing of Pegasus. *Piscis Australis*, or *Piscis Austrinus*, a constellation situated S. of Aquarius, contains Fomalhaut, a remarkable star of the first magnitude, and *Piscis Volans*, now *Volans* ('the flying-fish') is one of Bayer's S. constellations lying W. of Chamaeleon (q.v.).

Pisciculture, artificial breeding and rearing of fish for food and sport. The Egyptians, Greeks, and Romans practised P. to the extent of fattening edible fishes in specially constructed ponds. They may have been familiar with the art of breeding fish artificially, but the knowledge was lost, if it existed, until rediscovered by a monk in the 15th cent., who learnt how to hatch and rear trout in boxes in a running stream. Further discoveries in the middle of the 18th cent. caused great interest in the subject, but not till a century later were the practical possibilities much realised and applied. Most fish produce ova in enormous numbers, but the proportion of young that in nature reach maturity is very small owing to the great delicacy of the ova and young fish, and also to their numerous enemies. It is the object of P. substantially to

diminish this mortality, beginning with the shedding and impregnation of the ova, at any rate in the culture of the Salmonidae. Males and females are, when 'ripe,' placed in separate tanks through which water is running. A few females are caught in a landing net and one by one taken into the operator's hands and the ova expressed into a clean dry basin. When the artificial spawning is completed, a male is taken and the milt expressed into the basin amongst the eggs and then stirred by hand. A little water is added, and after about 30 min. the eggs are removed to the hatching boxes. Water which has passed through a filter-box containing 3 layers of gravel is run over the eggs to a depth of about 2 in. The trays are covered to exclude light in a temp. between 40° and 50° F. Incubation takes from 40 days to 3 months, according to temp. and other conditions. The ova stand handling for the first day, and then must be undisturbed until the eyes are visible, when they may be packed and transmitted long distances. The young that emerge from the eggs are called alevins. Each has attached to it a large transparent umbilical sac, which contains the nourishment necessary for 30 or 40 days. At the end of this period they begin to look for food, which, naturally, consists of minute crustacea, but is artificially supplemented by grated liver and other meat. During this stage, the most difficult period in P., the water entering the hatchery is no longer filtered; in fact, every effort is made to provide water which contains an abundance of suitable food. Later they are removed to ponds, and in a well-managed hatchery from 50 to 80 per cent reach the yearling stage, after which losses are normally small. In coarse-fish culture spawning is allowed to be done naturally, and the eggs hatch much more quickly, but require warmer water. Adequate protection of the ova and young is the chief factor in providing large numbers of these fish. Marine P. has in recent times received much attention, particularly in the U.S.A. See C. A. Hall, *Ponds and Fish Culture*, 1949; H. S. Davis, *Culture and Diseases of Game Fishes*, 1953.

Piscina (Lat. fish-pond, swimming-tank), originally a pond, tank, or cistern of any kind. In eccles. usage a small sink or perforated stone basin (Fr. *cuvette*) in a niche S. of the altar, at which the water used for rinsing the priest's hands, the chalice, and other vessels is poured away after the celebration of Mass. They were rare in England till the 13th cent.

Pisco, port of S. Peru, in the dept of Ica, 130 m. S. of Callao and Lima. It is on the Pan-Am. Highway and is an outlet for agric. products. P. Pueblo remains an old-world Sp. colonial tn; P. Plaza is modern and industrial, and exports cotton, grapes, and wine from the Ica, P., and Chincha valleys. There is an airport. Pop. 14,600.

Pisek, Czechoslovak tn in the region of České Budějovice (q.v.). It has textile,

brewing, and engineering industries. Pop. 18,900.

Pisgah ('boundary') (modern **Rās Siaghah**), O.T. name of a mt peak of Syria, Palestine, 2 m. from Jebel Neba (Mt Nebo of the O.T.), 6 m. from Hesban (anct *Heshbon*), E. of the N. extremity of the Dead Sea. It formed part of the range of Abarim (q.v.). See Num. xxi. 20, xxiii. 14; Deut. xxii. 49, xxxiv. 1.

Pisshpek, see **FRUNZE**.

Pisidia, inland dist. of Asia Minor, lying N. of Lycia and Pamphylia. It was a mountainous region inhabited by a warlike people, who maintained their independence against the successive rulers of Asia Minor in anct times.

Pisistratidae, name generally applied to Hippias and Hipparchus, sons of Pisistratus, but sometimes extended to mean the grandchildren, descendants, and near connections of Pisistratus (see Herod. viii. 52). Hippias succeeded his father, but Hipparchus apparently had some share in the government (see Thuc. vi. 54-9). It was the latter who set up the busts of Hermes as milestones on the highroads. The conspiracy of Harmodius (q.v.) and Aristogiton to eject these 'tyrants' is well known. Their plan miscarried, and only Hipparchus was slain, while they themselves lost their lives. Hippias was expelled a few years later, and finally fled to the Persian court, witnessing the defeat of the Persians at Marathon (490 bc).

Pisistratus (d. 527 bc), famous Athenian statesman, 'tyrant' of Athens 3 times between 560 and 527. He was the son of Hippocrates, of Pylian descent, and a relative and friend of Solon. After the estab. of Solon's constitution disturbances broke out between the rival parties of the plain, the highlands (Diacril), and the coast, Lycurgus, P., and Megacles the Alcmaeonid heading the 3 respectively. P.'s military abilities were displayed in the war with the Megarians and the campaign against Salamis (565). Having pretended that he had been attacked by his foes, P. had a bodyguard granted him, and, after increasing its number, was strong enough to seize the Acropolis (560). He was exiled (c. 554) by the combined forces of the plain and the coast factions, but quarrels then arose between these two and Megacles helped to restore P. (550). He was soon exiled again, but finally returned (540-39). His despotism was mainly of a mild kind and beneficial to the State. He built fine temples, including those of the Pythian Apollo and of Olympian Zeus (the latter being completed by Hadrian), and was a patron of literature. The first collection of Homer's poems was said to be due to him. He probably also instituted the Greater Panathenaea. See Herod. i. v. vi; Thuc. iii; Aristotle, *Ath. Pol.*, 13-16; Plutarch, *Solon*, 29-31; *Moralia*, 703, 805; *Pausanias*, 1-14; C. T. Seltman, *Athens*, 1924; and P. N. Ure, *Origins of Tyranny*, 1922.

Pisollite, see **COOLITE**.

Pissarro, Camille (1830-1903), Fr. painter, b. St Thomas, Danish West

Indies. He came to Paris and was influenced by Corot and Millet, becoming one of the most notable of the Impressionist school, and establishing a close friendship with Monet. In 1870 he went to England with Monet and painted a number of pictures of the Crystal Palace, Sydenham, and Upper Norwood; from 1874 he exhibited regularly with the Impressionist group. In 1886-8 he adopted the *pointilliste* technique, an extreme version of the impressionist use of pure colour. His most typical pictures are of the Fr. countryside and peasant life, though he painted some brilliant impressions of the Paris boulevards.

Pissarro, Lucien (1863-1944), Fr. artist, painter, and wood-engraver, b. Osny near Pontoise, son of Camille P. (q.v.). Under his father's influence he began to draw at an early age. He went to work in Paris for a firm of Eng. fabric merchants, but this was uncongenial. At the age of 20 he left France and settled in London, where he set up the Eragry Press (Eragry was the name of the vil. where his father had lived) and produced finely printed vols. illustrated with his own woodcuts or engravings. His paintings, impressionist in manner, showed a feeling for the Eng. countryside.

Pistacia, genus of small trees (family Anacardiaceae) with pinnate leaves and panicles or racemes of small dioecious green flowers, some of which have yellow anthers and crimson stigmas. *P. vera*, the pistachio-nut tree, bears small oval nuts containing a green kernel, much used in India and elsewhere in confectionery, and also in pharmacy as a restorative. *P. lentiscus* is the mastic tree, yielding the mastic of commerce. *P. terebinthus*, the turpentine tree, yields Chian or Cyprus turpentine, which exudes from incisions made in the trunk. The trees are sometimes grown out of doors in favoured dists., but even there need protection in cold weather.

Pistil, see **BOTANY; FLOWERS**.

Pistoia: 1. Prov. of Italy, in N. Tuscany (q.v.). The N. part is mountainous, but in the S. is a plain bisected NW.-SE. by a hilly ridge. It is watered by the Ombrone, the Pescia, and the Nievole. The prin. tns include P., Montecatini Terme, and Pescia (qq.v.). Area 380 sq. m. Pop. 222,000.

2. or **Pistoia** (anct **Pistoria**), It. tn, cap. of the prov. of P., 18 m. NW. of Florence (q.v.). The older, walled part of the tn stands on a ridge of the Apennines. In 62 bc P. was the scene of the battle in which Catilina (q.v.) was killed. During the Middle Ages it was a tn of importance, and it became part of the domains of the Medici (q.v.) in 1530. Sev. of its important monuments were severely damaged in the Second World War. The cathedral (partly 12th cent.) has a fine campanile (12th-13th cents.), and contains a famous altar of silver. The octagonal baptistery was designed by Andrea Pisano (q.v.), and in the church of S. Andrea there is a splendid pulpit by Giovanni Pisano (q.v.). There are sev. other not-

able churches, as well as palaces and the medieval Ceppo Hospital, on the façade of which is a magnificent terracotta frieze of the della Robbia (q.v.) school. P. is a holiday resort, and has manufs. of iron and steel goods, textiles, leather goods, and musical instruments. Pop. (cn) 28,400; (com.) 78,200.

Pistol. The word is of unknown origin. A P. is a one-handed weapon for swift use in self-defence at close range. The term covers single-shot pistols, revolvers, and also 'automatic' self-loading pistols. P.s formed the prin. armament of dragoons (q.v.), who carried a pair in holsters on either side of the saddle.

Automatic Pistols have the advantage of being less bulky and more easily and quickly loaded than revolvers, which they have largely replaced for military purposes. But their more complex mechanism renders them more likely to jam. A magazine of 6 or 8 rimless cartridges is slid into the butt from below, and the rounds are pressed upwards by a spring. The barrel and chamber are likewise held forward in the barrel-casing by pressure of a spring, so that the first round must be loaded and the pistol cocked by pulling the barrel backwards. When the first round is fired the recoil drives the barrel backward, the second round is automatically forced up into the breech, and the spent round ejected. Well-known military makes are Mauser, Colt, Browning, Luger, Walther, and Beretta. See also FIREARMS.

Pistole, name given to certain gold coins, formerly current in Spain, Italy, and sev. parts of Germany, but now obsolete. The P. was first used in Spain, and was then equivalent to about 11 old Fr. livres. From 1728 to 1772 it was worth 17s. 1d. sterling, but it gradually decreased in value and was finally withdrawn.

Piston, Walter (1894-), Amer. composer, b. Rockland, Maine, studied painting at first and later music with Nadia Boulanger in Paris. In 1926 he joined the Music Faculty at Harvard Univ., where he became prof. in 1944. His works include 4 symphonies and other orchestral music, chamber, piano and organ works, etc.

Piston, see GAS ENGINES; STEAM ENGINES; INTERNAL-COMBUSTION ENGINE.

Pistoria, see PISTOIA.

Pit Villages, groups of circular and rectangular pits excavated in the ground which were used by early man at many different places at many different times. The pits were roofed with clay or turf, or skins, raised up from the surface of the ground by a conical arrangement of poles, the silted-up holes for which can often be traced. Pit dwellings of the Mesolithic period, the earliest known in Britain, have been excavated near Farnham, Surrey, and in the Colne valley, Essex. Examples dating from the Neolithic period are recorded in Sussex; others were found under round and long barrows in Yorks. Many structures described as pit-dwellings were in fact underground storage-

pits for grain. They have been recognised in vils. and hill-forts of the Early Iron Age. From the number and capacity of these silos, archaeologists have been able to assess the yield and acreage of the contemporary fields. See also SOUTHERLANDS.

Pit Vipers, see RATTLESNAKES.

Pitaka, div. in the Buddhist Scriptures, which consist of three P.s, baskets, or collections. The first, *Vinaya P.*, deals with discipline and the Mahavagga (a hist. of the founding of the order); the second, *Sutta P.*, or collection of teachings, contains poems, fables, stories of Gautama, or Buddha, and about Buddhist saints, etc.; the third, the *Abhidhamma*, contains speculations and discussions on various subjects.

Pitcairn Island, is. in the Pacific Ocean, nearly equidistant from Australia and America, 25° 3' S. lat., 130° 8' W. long. It is a Brit. colony and, actually, the first Brit.-acquired land in the S. Seas. It has an area of 2 sq. m. Its length is about 2½ m., its breadth 1 m., and the coast is very rocky and inaccessible in most parts. P. I. has a fine climate; the soil is generally fertile, producing coconuts, bananas, breadfruit, yams, pineapples, tomatoes, etc. Oranges and pineapples are exported. It was discovered by Capt. Cartwright in his sloop *Swallow* (1767), who named it Pitcairn after the midshipman who sighted it. After his return to England Cartwright pub. an account of the *Swallow's* voyage; and there was a copy of the book in His Majesty's Armed Vessel *Bounty* when she sailed from Spithead in 1787. The is. remained unoccupied until 1790, when it was occupied by the mutineers of the *Bounty*, under Fletcher Christian, first officer and leader of the mutineers, with some women from Otaheite (see BOUNTY, MUTINY OF THE). Christian and his fellow-refugees destroyed the *Bounty* so as to sever all links with the outside world. For 18 years they remained undisturbed, until, in 1808, an Amer. vessel, *Topaz*, called at P. I., not knowing what land it was, on the chance of seals and fresh water: and her crew, to their astonishment, found that they had stumbled on the solution of the mystery of the *Bounty's* mutineers. The Amer. ship found that only one white man, John Adams, an able seaman of the *Bounty*, was left. He had trained the children of P. I. with the help of a Bible and a prayer book brought ashore from the *Bounty*. No regular gov. was estab., but assistance of some kind was given on the subsequent visit of Brit. vessels. Later the Pitcairners so thrived and multiplied on their small but fertile is. that they were threatened with over-pop., and in 1831 they were removed to Tahiti. But the land of their maternal forebears proved uncongenial, and in the following year all returned to P. I. By this time the is. was being increasingly visited by whalers, followed before long by passenger ships for fresh vegetables. In 1856 the pop. numbering 194 were, at their own request, shipped to Norfolk Is. (where the youngest

member of the party brought from P. I. actually survived until 1943). Forty of the party, however, soon returned, and at the beginning of the 20th cent. the pop. numbered nearly 200, and in 1936 it was 202. But in 1949 this figure had fallen to 125, owing to the emigration of numbers of young people to Australia and New Zealand. There are now something over 140 on Pitcairn, and 500-600 on Norfolk. P. I. was brought within the jurisdiction of the high commissioner for the W. Pacific in 1898, and in 1902 there were annexed to it the is. of Henderson, Ducie, and Oeno, occasionally visited by the Pitcairners for the collection of wood and other purposes. The Pitcairners elect their Is. Council annually by popular vote of all the islanders over 18. The Chief Magistrate is (since 1963) elected triennially, and the is. secretary appointed by the governor of Fiji. The latest revision of the regulations for the internal gov. of the is. was passed by a general assembly of all the native-born inhab. in 1940. Educational facilities exist, but there are no medical services or any regular steamer service between New Zealand and P. I. The Pitcairners were given proof of the interest of Great Britain in their affairs by the visit of H.R.H. the Duchess of Gloucester in 1947. In 1949 the original P. I. Bible was returned to P. I. by the Connecticut Historical Society, the islanders being now all Seventh Day Adventists. See H. L. Shapiro, *The Heritage of the Bounty*, 1936, and Sir H. C. Luke, *The British Pacific Islands*, 1943.

Pitcairne, Archibald (1652-1713), physician and poet, b. Edinburgh. He studied divinity and afterwards law at the univ. there and then medicine in Paris, whence returning to his native city he obtained a very extensive practice. He was a foundation member of the Royal College of Physicians of Edinburgh (1681) and was the originator of the Edinburgh Medical School (1685). He held the professorship of medicine at Leyden for a year (1692), and during that time the celebrated Boerhaave was among his pupils. P. was the author of *Dissertationes medicæ* (1701). He ridiculed the prevalent Puritanism, the satire on Presbyterianism, *Babel*, 1692, being considered his work. He also wrote the comedy *The Assembly; or Scotch Reformation*, 1722, 1752. See also C. Webster, *An Account of the Life and Writings of the celebrated Dr Archibald Pitcairne*, 1781.

Pitcairnia, genus of perennial herbs (family Bromeliaceae) from tropical America. Some species bear flowers in racemes of great beauty, and narrow or sword-shaped spiny leaves. *P. corallina*, *fulgens*, *nigra*, *ringens*, and *undulata* are fine species for pot culture in heated greenhouses.

Pitch is the black residue obtained on the distillation of coal tar. The term is sometimes also used for the residue left on the distillation of petroleum and for the naturally occurring petroleum residue

found in Trinidad and elsewhere. The former is more correctly termed 'bitumen' and the latter 'asphalt'; the term P. should be confined to the residue from tar. In its normal grade—medium soft P.—it is a black shiny solid at ordinary temperature which breaks with a conchoidal fracture and softens on heating to a viscous liquid. P. may be regarded as a cheap and readily available thermoplastic resin, and its uses are mainly as a binding agent or as a protective coating. It forms the main constituent of road tars and anti-corrosion bituminous paints; it is largely used as a binder in making coal briquettes and for the production of mastics and roofing felts. It is also used extensively either alone or fluxed with creosote (q.v.) as a liquid fuel in open-hearth steel furnaces, glass-melting furnaces, etc.

Pitch, exact height (or depth) of any musical sound according to the number of vibrations that produce it; also the standard by which notes, with the A above middle C as a starting-point, are to be tuned, a standard which determines at how many vibrations to the second that A is to be taken, as well as every other note in relation to it. P. varied at different times and in different countries. Early in the 19th cent. it was gradually raised, especially by makers of wind instruments, to secure more brilliant effect, but with results dangerous to singers, and in England 2 P.s were in use, the higher for orchestral performances and the lower classical or Fr. P. for church and purely vocal music. The new philharmonic P., with 439 vibrations per second at 68° F., then came into general use, even by military bands, which until 1927 used the old philharmonic P., which was slightly higher. The internationally agreed standard of P. is broadcast by the B.B.C. as the Third Programme tuning signal. It has a frequency of 440 cycles per sec. and corresponds to the note A in the treble clef.

Pitch, in engineering, distance between 2 successive windings of a screw measured in a direction parallel to the axis of the screw. The P. of gear-wheels is known as circular P., i.e. the length of that part of the P. circle between the centres of 2 consecutive teeth, the P. circle being an imaginary circle on a gear-wheel along which the circular P. is measured. The circle goes through the points of the teeth where they touch the teeth of the other wheel of the pair. The P. circles of 2 wheels in gear touch one another. The diameter of a gear-wheel is always the P. circle diameter unless otherwise stated. For variable P. in airscrews see AEROPLANES, *Structural Development*.

Pitchblende, or Uraninite. Essentially U₃O₈ but contains other metals as well, generally occurring massive or botryoidal. It is a brownish or black solid with a greasy lustre (h. 5.5; sp. gr. 6.4-9.7), and when crystalline it forms cubic crystals. At Jáchymov, Bohemia, sodium uranate is manufactured from it. Its chief value is for the uranium (q.v.) and radium con-

tained, and it is obtained for this purpose from Cornwall, where it is associated with tin ores, from Saxony (Marlenberg), Bohemia, Norway (Kongsberg), and the Great Bear Lake in Canada.

Pitcher Plant (*Nepenthes*), large genus and family (Nepenthaceae) of insectivorous shrubs found in E. tropical forests, with alternate leaves and midrib enlarged into a pitcher-shaped receptacle with a partly opened lid. The thick corrugated mouths of the pitcher produce sweet secretions which attract insects. These collect within and are digested by other glandular secretions. The Californian *P. P.*, *Darlingtonia californica*, bears leaves in the form of erect trumpet-shaped tubes with a swollen hood at the top, in which is the opening to the pitcher. In the E. U.S.A. the side-saddle plant, *Sarracenia*, also bears insectivorous pitchers.

Pitheonite, name given to glassy rocks which are characterised by a resinous lustre. Such rocks have a microcrystalline ground mass, peculiar groupings of microlites (q.v.) being observable in microscopic sections. The crystallites contained are generally of ferro-magnesian minerals. P.s break with a splintery fracture, are black or dark green in colour, and are found as intrusive dykes (Arran) and as contemporaneous sheets (Sculr of Elgg).

Pitești, cap. of the prov. of Pitești, Rumania, 70 m. WNW. of Bucharest, on the R. Argeș. Pop. (1950) 19,500.

Pithecanthropus Erectus, remains of man-like skeletons found by Eugene Dubois in some volcanic tufts of probable Pleistocene age, near Trinil, Java. The relics discovered were the roof of a skull, 2 molar teeth, and a femur, the form of which indicated that its possessor walked erect. The skull capacity was that of a human. Later similar discoveries were made in Java by von Koenigswald. See also ANTHROPOLOGY; MAN.

Pithecosa, see ISCHIA.

Pithiviers, Fr. tn, cap. of an arron., in the dept of Loiret, on the Oeuf. A very picturesque tn, it is famous for its cakes and honey. There are saffron, sugar, and malt industries. Pop. 7100.

Piti, see GUAM.

Pitiscus, Bartholomeus, Ger. mathematician, (1561-1613). author of *Trigonometria*, 1595, the first text-book of trigonometry (q.v.).

Pitlochry, burgh and health resort in Perthshire, Scotland, on R. Tummel, with fishing, golf, many hotels, and the well-known P. Festival Theatre, all set amidst picturesque scenery. P. is the centre of the Tummel-Garry Hydro-electric scheme, and has distilling and tweed-making industries. Pop. 2500.

Pitman, Sir Isaac (1813-97), inventor of the system of shorthand known by his name, b. Trowbridge, Wilts. While teaching as a schoolmaster at Wotton-under-Edge, he pub. his *Stenographic Sound Hand*, and later gave himself up entirely to the work of spreading the system there propounded. In 1842 he

commenced the *Phonetic Journal*, which he carried on until his death. P. was a strong supporter of spelling reform. He founded the publishing house which bears his name, and pub. books on shorthand and commercial and technical subjects. He was knighted in 1894. See lives by T. A. Reed, 1890, and A. Baker, 1908. See also SHORTHAND.

Pitot Tube, instrument designed to measure high velocities of running water, such as rivers. It consists essentially of an L-shaped glass tube, the horizontal arm being placed under the water, and a graduated scale to note how high the water rises in the vertical arm of the tube through the force of the stream. The velocity is found from the formula $V = c\sqrt{2gH}$, where H = height of water in the tube in feet, $g = 32.2$, c = a constant depending on the type of tube, and V = the velocity of the water in feet per sec. For pressure tube see under MANOMETER.

Pitri (Sanskrit *pitr*, father), in ancient Hindu mythology, a class of divine beings who dwell in celestial regions and received into their company the souls of the righteous dead. Later they were divided into 2 classes, the original divine beings and the manes of deceased ancestors, who became semi-divine, and to whom devout Hindus had to make offerings. Hence the importance attached to having a male heir or adopted son.

Pittscotie, see LINDSAY.

Pitt, William, the Elder, see CHATHAM, FIRST EARL OF.

Pitt, William, the Younger (1759-1806), Brit. statesman, b. Hayes, Kent, was the younger son of Wm P., first Earl of Chatham (q.v.). He was educ. at Pembroke Hall, Cambridge, and called to the Bar in 1780. He did not practise as a lawyer, however, but entered Parliament in 1781 as a supporter of Shelburne. His maiden speech, in favour of Burke's Bill for economical reform, on 26 Feb., drew extravagant praise from the leading orators, Burke, Fox, and North all praising it enthusiastically. He declined a minor office under Rockingham, but became chancellor of the Exchequer under Shelburne in 1782, being then 23 years of age. When Shelburne resigned early in the next year, the king offered P. the Treasury, but, tempting though the offer was, the young man, after some hesitation, declined to take office, as he could not then command the necessary support. A coalition ministry was then formed by North and Fox, but was defeated in Dec. on the India Bill, and then P., being still under five-and-twenty, became first lord of the Treasury and chancellor of the Exchequer. He had everything to contend against. His youth militated against him, and he was in a minority in the House of Commons. He held to office until he felt he had the country with him, and then had recourse to a general election (1784), when he obtained a great majority. He himself was returned for Cambridge Univ., which he represented for the rest of his life. He now devoted his attention to the finances of the nation, and introduced

many wise measures, among which was the institution of a sinking fund for the reduction of the national debt. He maintained a neutral attitude towards the Fr. Revolution, but in 1793 France declared war on England, and then P. entered into alliances with many great continental powers, and aided the coalition with large grants for the hiring of troops. The Brit. Navy was successful in its battles, but the coalition suffered severely on land, and there was much dissatisfaction at home, where the mob clamoured for P.'s resignation. He was anxious to make peace, but, being unable to do so on honourable terms, vigorously prosecuted the war. He effected the union of Great Britain and Ireland in 1800,



WILLIAM PITT, THE YOUNGER

but in the following year resigned office owing to the opposition of the king to a measure of Catholic Emancipation. He was succeeded by Addington, whose administration he at first supported, and he spoke in support of the Peace of Amiens. When war broke out again in May 1803, it was evident that the Addington ministry could not prosecute it effectively, and a year later P. was again called to lead the country. He formed a third coalition, but Spain joined France, and the allied forces could not make headway against the combination. The capitulation of Ulm broke up the coalition, and it is said that the battle of Austerlitz was his death-blow. He was buried in Westminster Abbey; his debts were paid by the nation. It was the ambition of P. to be a peace minister, and to devote himself to domestic legislation, but it was his destiny from 1793 to be a war minister, and a war minister during a period of terrific conflict, and as a result he felt forced to pursue a policy of domestic repression which has been much criticised. Though without the fire and personal charm of Fox, P. was an excellent orator

and a sound debater. His sole aim was the improvement of the state of his country, and the maintenance of its prestige abroad, and his career, like his father's, was entirely free from financial corruption. See lives by Lord Stanhope, 1862; Lord Rosebery, 1914; and J. H. Rose, 1934; also *Letters to his nephew, Thomas Pitt, afterwards Lord Camelford* (2nd ed.), 1804; W. S. Taylor and J. H. Pringle (eds.), *Correspondence, 1838-40*; J. H. Rose, *William Pitt and the Great War*, 1934; D. G. Barnes, *George III and William Pitt*, 1939; E. Eyck, *Die Pitts und die Fox*, 1946; and Sir T. Lever, *The House of Pitt*, 1948.

Pitt-Rivers, Augustus Henry (b. Lane-Fox) (1827-1900), soldier and archaeologist. He entered the Army in 1845, served in the Crimean war, and rose to the rank of lieutenant-gen., specialising in the design and evolution of weapons. Always interested in ethnology, he formed a splendid collection, illustrative of the development and progress of human invention, which he presented to Oxford Univ. On succeeding to the Rivers estates at Rushworth in 1880 he instituted numerous scientifically conducted excavations, which he described in 4 vols., *Excavations in Cranborne Chase*, 1897-8. He also wrote many articles in scientific journals. P.-R. laid the foundations of modern excavation technique with emphasis on accurate plans and relic-tables, the significance of stratification, the use of percussion to determine silted pits and ditches, and the great importance of common everyday objects. At Farnham, Dorset, is the P.-R. Museum, with scale models of his excavations, fine ethnographical collections, and prehistoric antiquities. See memoir by H. St G. Gray, 1905.

Pitta, genus of brilliantly coloured songless passerine birds typical of the family Pittidae or old-world ant thrushes. One species occurs in W. Africa, and the others range from Australia to the Himalayas; one is common in Burma.

Pittacus (c. 650-570 BC), Gk statesman, philosopher, and poet, one of the 'Seven Sages of Greece.' He fought successfully against the Athenians, slaying Phrynion (606), and became ruler (*acsymnede*) of Mytilene and Lesbos (c. 589-579). He was a contemporary of Alcæus and Sappho. See Diog. Laërt.; Suidas, *Pittacus*.

Pittenweem, royal burgh of Fife, Scotland, 4½ m. from Elie, with remains of a 12th-cent. Augustinian priory, including its gatehouse. Pop. 1610.

Pitter, Ruth (1897-), poetess, b. Ilford, Essex. Educ. at a school in Bow, she worked with an arts and crafts firm, then set up a similar business of her own in Chelsea. She started writing verse at an early age, finding her inspiration mainly in the beauty of nature. In 1936 her vol. *A Trophy of Arms* was awarded the Hawthornden Prize, and in 1953 *The Ermine* received the Heinemann Foundation Award. Others of her books of verse are *First and Second Poems*, 1927, *Perse-*

phone in *Hades*, 1931, *A Mad Lady's Garland*, 1934, *The Spirit Watches*, 1938, *The Rude Potato*, 1941, *The Bridge*, 1946, *Pitter on Cats*, 1947, and *Urania*, 1951. In 1955 she was awarded the Queen's Gold Medal for Poetry.

Pitts Gallery, see OFFIZI.

Pittosporaceae, dicotyledonous family of shrubs and trees, chiefly Australian, with leathery, alternate, evergreen leaves, perfect, 5-petalled flowers, hypogynous stamens, superior carpels, and capsular or berry fruits. *Billardiera*, *Bussaria*, *Cheiranthra*, *Pittosporum*, and *Sollya* are typical genera, with species in cultivation.

Pittsburg, city of Crawford co., Kansas, U.S.A., 130 m. S. of Kansas City. It is a trade and coal- and zinc-mining centre, with railroad repair shops, foundry work, dairying, meat packing, and flour milling, and also manufs. of metal ware, bricks, cigars, and earthenware. It was founded in 1872, and incorporated as a city in 1880. Pop. 19,341.

Pittsburgh, second city of Pennsylvania, U.S.A., and co. seat of Allegheny co., at confluence of Monongahela and Allegheny R.s (which hereafter form the Ohio), 264 m. W. of Philadelphia. It has a harbour frontage of 54 m. It has a riv.-level altitude 702 ft above sea, but the suburbs are on the heights above the city, which covers an area of over 35 sq. m. One of the finest buildings is the Allegheny co. court-house, which cost over \$4m. to build. P. Univ., Duquesne Univ., the Pennsylvania College for Women, and the Carnegie Inst. of Technology are all at P. There are over 12,504 ac. of park, Schenley Park and Highland Park being the 2 largest, there being large zoological gardens in the latter. P. is the focus of many trunk railways, including the Pennsylvania, the Baltimore and Ohio, the Erie and P., and the P., Cincinnati, and Chicago, as well as being an important riv. port, handling about 30,000,000 tons of goods each year. The 'smelters' and furnaces make the city a glare of light by night. A quarter of the entire output of pig-iron in the U.S.A. is from P., which is often called the 'Steel City.' There are large petroleum refineries and famous steel works. Prin. manufs. are nails, rails, steel-plate, stone, and all kinds of electric machinery, for which it is noted; it is also a great ship-building centre. There is much interstate commerce by means of the Ohio R. In 1948 one of the greatest single concentrations of wealth in the U.S.A. was in P., in the hands of the descendants of A. W. Mellon. P. occupies the site of Fort Duquesne, later renamed Fort Pitt, built in 1759 during the war against Pontiac, an Indian chief. Washington, prospecting in those parts in 1753, saw the suitability of the spot; a stockade was built, but torn down by the French, who then built their Fort Duquesne here (1754), in marching on which Braddock was heavily defeated. With Pitt Prime Minister, the British in 1758 again advanced on Fort Duquesne. The French blew it up and set fire to it. Gen. Forbes an-

nouncing success headed his letter 'Fort Duquesne or now Pitt's Borough.' After the opening up of NW. ter. in 1785, the growth of P. was rapid. Pop. 678,806.

Pittsfield, city in Berkshire co., Massachusetts, U.S.A., on the Housatonic R. 150 m. W. of Boston. It has manufs. of woollens, clothing, electrical goods, paper, foundry and machine-shop products, and plastics; it also has a printing industry and a tourist trade. Pop. 53,348. See Smith, *History of Pittsfield*, 1876.

Pittston, city in Luzerne co., Pennsylvania, U.S.A., in an anthracite coal dist., on the Susquehanna R., 10 m. SW. of Scranton. It has railroad shops and manufacturing industries. Pop. 16,000.

Pituitary Body, or **Hypophysis Cerebri**, small reddish vascular body about the size of a pea; it is situated at the base of the brain, embedded in a cavity of the skull known as the *sella turcica*. It consists of 2 main portions, the anterior lobe, derived from the embryonic mouth cavity, and the posterior lobe, arising as a downgrowth from the brain. The P. B. is an important ductless gland (g.v.) secreting many hormones (g.v.) which influence other parts of the body. The secretion of the anterior lobe contains hormones which stimulate the thyroid, parathyroid, and adrenal glands (*adrenocorticotrophin* or *A.C.T.H.*), as well as the sex organs, and the mammary glands (*prolactin*). One anterior lobe hormone is concerned in the regulation of growth; deficiency of this substance is seen in midjets, whilst excess causes gigantism (in adolescence) or acromegaly (in adults); the latter condition is characterised by overgrowth of bones in the extremities and the face, the nose and lower jaw becoming especially prominent. The hormones secreted by the posterior lobe are concerned in the regulation of water balance in the body (*antidiuretic hormone*) and also cause the contraction of unstriated muscle, including that of the uterus; hence an extract of this lobe is useful in childbirth. Removal of the posterior lobe in a frog causes the skin to become pale, showing that one of the hormones is responsible for expansion of pigment in the pigment cells (melanophores), with consequent darkening of the skin. Without the P. B. life ceases within a few days. See under **HORMONES**.

Pityriasis (Gk *Pituron*, bran), skin disease characterised by the desquamation of branny particles. *P. Seborrhoea capitis* is marked by loss of hair or lack of lustre, constant itching, and the shedding of dry or fatty scales from the surface of the scalp. It leads to baldness, at least in some individuals; 1-2 per cent sulphur salicylic ointment forms the best dressing. *P. circinata et marginata* is characterised by the formation of pink spots on the limbs and trunk, with fever and itching. *P. rubra* is a chronic inflammatory disease, beginning with deep red patches, which gradually coalesce until the whole body is involved; there is usually a fatal ending. *P. rosea* commences as a rosy-red 'herald patch,' about the size of a shilling, on the

trunk, and is followed by a generalised eruption of pink spots, which do not itch. It usually clears up in a few weeks without treatment. Sometimes it is mistaken for secondary syphilis. *P. versicolor* or *Tinea versicolor*, see RINGWORM.

Piura: 1. Dept. of NW. Peru, area 15,239 sq. m.; it is mountainous in the E. and desert in the W. Cotton is grown, and petroleum (in the Lobitos area), salt, sulphur, and soda found. Pop. 514,162.

2. Cap. of the above dept, seat of a bishopric; 20 m. from the coast, and 80 m. SE. of Cape Blanco. It was the first permanent settlement made by Pizarro. It is connected by a railroad with the port of Paíta (60 m.), and is an important cotton and petroleum market. Catacaos, 12 m. away, has a large manuf. of Panama hats. Pop. 24,620.

Pius, name of 12 popes:

Pius I, *Saint*, was Pope from c. 140 to 155. During his pontificate the heretics Valentinus and Marcion visited Rome. P. may have been b. a slave; his pontificate was one of energetic opposition to the Gnostics.

Pius II (1458-64), Aeneas Sylvius Piccolomini, b. at Corsignano, was made cardinal by Calixtus III in 1456, and elected Pope in 1458. He was interested in eccles. reform and had a scheme of procedure drawn up by Nicholas of Cusa and Dominic de Dominicis (see life by C. Ady, 1913). The great object of his pontificate was the expulsion of the Turks from Europe, but the period of crusading zeal was over, and the discord between the various powers prevented any united action against the Turk. P. at last decided himself to head the crusaders, but d. on the way to Ancona.

Pius III (1439-1503), Francesco Todeschini Piccolomini, b. Milan, reigned for only 4 weeks (Sept.-Oct. 1503) after planning general reform of the Church.

Pius IV (1499-1565), Giovanni Angelo Medici, belonged to the family of the Medici of Milan. He was elected Pope in 1559. His main energies were devoted to carrying through the final sessions of the Council of Trent, and his name has ever since been connected with the Profession of Faith which he issued after the council, and to which all holding an eccles. office must give assent.

Pius V, *Saint* (1504-72), Michele Ghislieri b. in Lombardy. Becoming Pope in 1566, he was notable for his zeal against heresy and for the vigorous manner in which he promoted and directed the reformation of morals within the Church, and the campaign directed towards recovery of the ground lost at the Reformation. From him came the excommunication of Elizabeth in 1570, and to him was largely due the victory over the Turks at Lepanto in 1571. His pontificate has been described as the most brilliant of the Catholic revival; but some historians have questioned the worth of his methods. He was canonised in 1712.

Pius VI (1717-99), Giovanni Angelo Braschi, b. Cesena. He became Pope

in 1775 and carried on an energetic campaign against Gallicanism and the 'Josephism' of the Emperor Joseph II. During the Fr. Revolution he refused to accept the *Constitution civile du clergé*, and aided the allies against the rep. As a result Napoleon attacked the papal states and forced P. to accept the Truce of Bologna (1796). In 1798 the Pope was removed from Rome, and d. at Valence. P. was a great patron of the arts, but many of his schemes were halted by the revolution.

Pius VII (1740-1823), Luigi Chiaramonti, b. Cesena. A Benedictine, he was elected Pope in 1800, devoted most of his energies to a settlement with France, and concluded in 1801 the famous concordat with Napoleon I. Later, relations with Napoleon became strained. Napoleon annexed the papal states and was thereupon excommunicated. P. was then arrested by Fr. troops and imprisoned at Fontainebleau. He was released on the emperor's fall and returned to Rome. P. re-estab. the Society of Jesus.

Pius VIII (1761-1830), Francesco Xaviero Castiglioni, b. Cingoli, carried through no works of importance during his brief pontificate (1829-30), which was notable, however, for the emancipation of the Eng. Catholics.

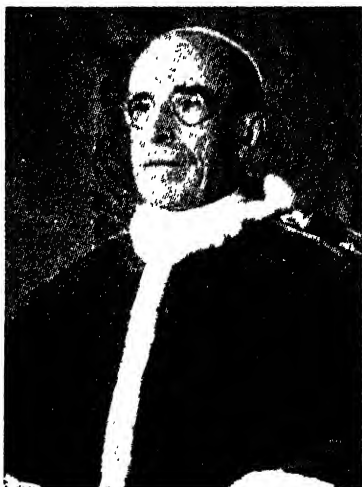
Pius IX (1792-1878), Giovanni Maria Mastai-Ferretti, b. Sinigaglia and elected Pope in 1846. He marked the beginning of his pontificate by reforms of a liberal nature. He promulgated a constitution providing for a bi-cameral parliament (1848), which, however, really left untouched the greater problem of popular representation in the papal states. The constitution was prevented from being carried into effect by the revolt of 1848, when the popular enthusiasm for national It. unity overwhelmed all other aspirations. This enthusiasm culminated in bitter hostility towards Austria, but P. proclaimed his neutrality, with the result that 2 years later he was forced to leave Rome and take refuge at Gaeta, only returning with the assistance of foreign arms in 1850. Administration in the papal states now became unprogressive, their very existence being dependent on the continued support of their protectors, France and Austria. This protection, however, was lost after Napoleon III had come to an arrangement with Cavour, with the immediate consequence that the Pope lost the greater part of his dominions. The one barrier to national unity now remaining, the states of the Church, was removed in 1871 when the papal states were absorbed in United Italy, though P. never accepted the incorporation of the papal states and of Rome into the It. kingdom. As head of the Church P. supported the principles of the Ultramontane party and worked effectively towards that party's eventual success (see ULTRAMONTANE). His pontificate is memorable for the proclamation by the bull of 8 Dec. 1854 of the dogma of the Immaculate Conception of the

Virgin Mary; for the Vatican Council proclamation in July 1870 of papal infallibility and the universality of the papal episcopate; and for the restoration, in 1850, of the hierarchy in England. See lives by A. O. Legge, 1875, and T. A. Trollope, 1878.

Pius X, Saint (1835-1914), Giuseppe Melchiorre Sarto, b. Riese. He became Pope in 1903 and was a great reforming Pope, as his motto *instaurare omnia in Christo* implies. He reorganised the Curia, set up a commission for the revision of the Vulgate, codified the Canon Law, revised the Breviary, promoted the Gregorian Chant, condemned Modernism, and enjoined earlier and more frequent reception of Communion. He beatified Joan of Arc in 1909 and canonised her in 1920. P. also took steps to bring about the reconciliation between the papacy and the It. kingdom which P. XI was to complete. He was canonised in 1954. See lives by F. A. Forbes, 1918, and R. Bazin, 1939.

Pius XI (1857-1939), Achille Ratti, b. Desio, in the diocese of Milan. He studied at Lombard College, Rome, and at the Gregorian Univ. he obtained the triple doctorate in philosophy, theology, and law. From 1882 to 1886 he taught theology at the episcopal seminary in Milan. In 1886 he was at the Ambrosian Library and then librarian at Milan. He was an alpinist, and made the first It. traverse of Monte Rosa from Macugnaga (1889). In 1911 he was called to Rome to administer the Vatican Library. He became apostolic nuncio to Poland, 1918, and in 1919 was made titular archbishop of Lepanto. Two years later he was created archbishop of Milan and a cardinal, and was thus only a cardinal of one year's standing when he was made Pope (1922). He was a brilliant scholar, and greatly extended the diplomatic relationships of the Holy See. His most outstanding achievement was the solution of the 'Roman Question' in 1929 by the Lateran treaty (q.v.), which restored the temporal power of the papacy and estab. a concordat between the Church and the It. Gov. In a famous letter, *Non abbiamo bisogno*, he protested in 1931 against the pagan worship of the state in Fascist Italy, and the denial in matters of education of the natural rights of the family as well as the supernatural rights of the Church. In a yet more famous letter, *Mit brennender Sorge*, in March 1937, he protested against the violation of natural law and justice in Nazi Germany, and reminded Hitler that man as a person possesses rights which must be preserved against every attempt by the community to deny, suppress, or hinder their exercise. In the same week, in a letter *Divini Redemptoris*, he condemned atheist communism as 'a gospel full of errors and illusions' which destroyed the foundation of social order and denied the rights, dignity, and freedom of human personality. See life by W. and L. Townsend, 1930; also W. Solzbachel, *Pius als Verteidiger der menschlichen Persönlichkeit*, 1939.

Pius XII (1876-), Eugenio Pacelli, b. Rome. From 1904 to 1914 he was prof. of eccles. diplomacy at Rome. In 1917 he became titular archbishop of Sardes. He went as nuncio to Munich in 1917, and to Berlin in 1920, negotiating the concordat with Bavaria in 1924. He was made a cardinal in 1929, and became secretary of state the following year. He was P. XI's chief adviser in the latter's anti-Nazi policy, and his election as P. XII on P. XI's death (1939) was interpreted as implying a continuation of the Vatican's anti-Nazi attitude. P. made many vain efforts to prevent the Second World War by offers of mediation. In Dec. 1939 he denounced 'premeditated aggression' and 'contempt for freedom and human life from which originate acts which cry to God for vengeance,' and he made continual efforts to help Catholic and non-Catholic war victims on both sides. He attempted to prevent Mussolini from driving Italy into the Second World War, and after the close of fighting made efforts to aid the re-estab. of religion in Germany. He has continually and strenuously opposed the eccles. policy of Communist countries in E. Europe. In 1950 he defined the doctrine of the corporal assumption of the Blessed Virgin.



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POPE PIUS XII

In 1955-7 he restored the Holy Week liturgy and revised the rules for fasting before Holy Communion. See N. Padellaro, *Pius XII* (Eng. trans.), 1957. See also POPES, LIST OF THE.

Pix, Trial of the, see PYX.

Pixy, or Pixie, name given to one kind of fairy in Devon and Cornish folk-lore. The word is by some considered to be the

same as 'pucksy,' the diminutive *sy* being added as in Betsy or Topsy. In Truro, moths, which were regarded by some as departed souls, by others as fairies, were called 'pisgles' (cf. Gk *psuchē*, which is both 'soul' and 'moth'). P.s were believed to kidnap children and to lead travellers astray, like will-o'-the-wisps, whence the phrase 'pixy-led.' In fairy mythology everything that is done elsewhere by fairies, boggarts, or similar beings is done in Devon by P.s. See T. Keightley, *Fairy Mythology*, 1828; Mrs A. E. Bray, *Traditions, Legends, Superstitions, and Sketches of Devonshire*, 1838; and R. Hunt, *Popular Romances of the West of England*, 1865, 1923.

Pizarro, Francisco (1478-1541), discoverer and conqueror of Peru, b. Truxillo, the natural son of Gonzalo P., an officer who served with great distinction under *el Gran Capitán* in the Neapolitan wars. In early life he became a soldier and went to America. Among other expeditions, he took part in those of Ojeda and Nuñez de Balboa. When he had already served for 14 years he joined Hernando de Luque and Diego de Almagro in a project for extending the Sp. conquests along the S. coast. In 1524 he sailed from Panama with a single ship and about 100 men, leaving Almagro to follow with reinforcements as soon as possible. The expedition was not successful, and P. returned in 1528 to Panama, and then he returned to Spain. Here he got himself appointed governor over all the country to be discovered, with supreme authority in all matters. The new expedition started in 1531, and P. was now completely successful. Peru was at that time divided by a civil war between the two brothers Atahualpa and Huascar, and of this full advantage was taken. Almagro passed on to Chile, but a quarrel which arose between him and P. led to his execution in 1538. His son then formed a centre of dissatisfaction for the many who were dissatisfied with the conquistador's rule, and a party of these ultimately assassinated P. in 1541. See W. H. Prescott, *History of the Conquest of Peru*, 1889, and P. Shay, *Incredible Pizarro, Conqueror of Peru*, 1932; also life by L. Baudin, 1930.

Pizzetti, Ildebrando (1880-), It. composer, b. Parma, where he studied at the Conservatory. From 1924-36 he was director of the Milan Conservatory, and in the latter year he became prof. of composition (master class) at the Accademia di Santa Cecilia in Rome. He is especially remarkable as a composer of serious, heroic, rather austere operas, for which he wrote his own libretti, except for the first, *Fedra* (produced 1915), which is by Gabriele d'Annunzio. The others are *Debora e Jael*, 1922, *Lo straniero*, 1930, *Fra Gherardo*, 1928, *Orsola*, 1935, *L'oro*, 1947, and *Vanna Lupa*, 1949. He also wrote incidental music for plays, film music, choral and orchestral works, chamber music, songs, etc.

Pizzicato (It. = pinched), term used in music composed for stringed instruments

to denote that the strings are to be plucked with the fingers as in a harp instead of sounded with the bow. It was first employed by Monteverdi (1567-1643).

Place, Francis (1771-1854), reformer, b. London, where he became a tailor, but from an early age was interested in political affairs. He took an active part in securing the return of Sir Francis Burdett for Westminster in 1807, and was on intimate terms with Robert Owen, Mill, Bentham, and Hume. He issued many pamphlets, and left an autobiography, not yet pub. It was largely P.'s agitation which brought about the repeal of the Combination Acts in 1824; but after the passing of the Reform Bill in 1832 his political influence declined. See life by G. Wallas, 1898.

Place de la Concorde, see CONCORDE.

Place-names, see NAMES.

Placenta, or **After-birth**, structure which unites the foetal mammal to the womb of the mother until birth, in which foetal and maternal blood circulate, so establishing a nutritive connection between them. The connection is, however, merely by diffusion: as a rule there is no actual intermingling of foetal and maternal blood, but this is not always the case (see *Hæmolytic Diseases of the New-born*, under OBSTETRICS). The P. is essentially mammalian, but is not found in egg-laying monotremes, and is only rudimentary in marsupials, which bring forth their young very imperfectly developed, after a very short gestation. In all other mammals it occurs as a double vascular sponge, which enables the foetus to obtain nourishment and oxygen from the blood of the mother, and to remove its waste (excretory) products. A somewhat similar structure occurs in 2 cartilaginous fishes and 2 lizards. The P. commences from the allantois (q.v.), which grows out into the space between the inner (amnion proper) and the outer (subzonal membrane) folds of the amnion (q.v.). The allantois unites with the subzonal membrane, and from this united area (true *chorion*) vascular villi grow out into crypts in the uterine wall. Simultaneously a part of the uterine wall becomes modified into a spongy vascular tissue. Thus the P. consists of 2 parts, the maternal, or the modified portion of the uterine wall, and the embryonic, or that part of the allantois fused to the subzonal region which gives off villi, and therefore a more or less intimate union is formed between the embryo and the mother. The embryonic part of the P. is naturally shed at birth, and in some cases the maternal part is also discharged. In the latter case the placenta is said to be deciduate, and when only the embryonic part comes away, then it is said to be in deciduate. Of in deciduate placentations there are 2 varieties: (1) diffuse, as in lemurs, cetacea, and ungulates (except ruminants), when the villi are uniformly scattered over the embryonic sac; and (2) cotyledonary, as in ruminants, when the villi occur in patches. Of deciduate placentations 3 types may be noted: (1) zonary

as in elephants, carnivora, etc., when the villi form a band around the embryo; (2) discoidal, as in rodents, bats, and insectivores, when the villi form a disk; and (3) meta-discoidal, as in monkeys and man, when the villi are first diffuse or scattered, and afterwards collected into a disk. See ALLANTOIS, AMNION, FETUS, MEMBRANES, etc.

Placentia, seaport of Newfoundland, at the E. side of P. Bay. Pop. 891.

Placentia, or **Placenza**, see **PLACENZA**.

Placer Deposits, see **MINING**.

Placitum Regium, i.e. royal consent, term used to denote the approbation by a civil ruler of papal or eccles. enactments by which they acquire binding force within his ters. If this approbation is given by the ruler himself it is called an

igneous rocks, but also occurs in association with orthoclase in many more acid rocks. On weathering these felspars decompose into kaolin, calcite, prehnite, and zeolites.

Plagium, in Scots Law, is the theft of a child under the age of puberty from the possession of its parents or guardians.

Plague, in general, any fatal epidemic disease. The modern application of the term is, however, restricted to that contagious disease also known as *bubonic* (q.v.) and *Oriental P.*, which is due to the presence of a specific micro-organism, *Bacillus pestis*. *P.* is endemic in Eastern and Central Asia. The incubation period is 3-8 days. Although bubonic *P.* is usually associated with the formation of buboes, or inflamed lymphatic glands,



Bibliothèque Royale de Belgique: MS. 13076-7, f. 24.

PLAGUE: THE BLACK DEATH

exequatur (i.e. let him proceed), if by a subordinate it is a *P. R.*

Placoderms ('plate-skinned'), a fossil class of fish-like vertebrates. They are the most primitive members of the gnathostomes (or jawed fishes). They include the acanthodians, arthrodires, antiarchs, and stegoselachians (q.v.).

Plagioclase, general name given by petrographers to the triclinic felspars, which may be regarded as mixtures in various proportions of albite (soda-felspar) and anorthite (lime-felspar). Oligoclase (soda-lime) and labradorite (lime-soda) are *P.* felspars, the latter showing a peculiar iridescence. Under the microscope the crystals show a fine parallel striping, which indicates polysynthetic twinning and distinguishes them from orthoclase. In polarised light *P.* shows grey and yellow colours, the twinning bands being clearly seen. *P.* is a characteristic constituent of basic and sub-basic

there are 3 varieties recognised, in 2 of which no such manifestations are to be observed. In the variety which is specifically known as *bubonic* the most prominent symptoms are, in the early stage, headache, delirium, sleeplessness, and high temp.; constipation is usually an accompaniment, but it may be followed by diarrhoea in severe cases. The characteristic symptom is, however, the appearance of the buboes, which usually occur on the second day. They most commonly appear in the groin or in the armpit, and tend to suppurate with sloughing of the skin. The liver, spleen, and kidneys become enlarged, the lungs are engorged, and the tendency is towards collapse through the general congestion and oedema. The pneumonic variety of *P.* is accompanied by all the characteristic symptoms of broncho-pneumonia. The course of the disease is rapid and the chances of recovery small. Unless the

disease is prevalent, its identification depends upon the discovery of the bacillus, which is contained in the sputum. The third, or septicaemic, variety bears the general symptoms of the bubonic variety, with the exception of the presence of buboes. The lymphatic glands are enlarged, but without the effect on the surrounding tissues observed in bubonic cases. The condition almost invariably terminates with death in a few days, after acute delirium and extreme prostration.

The nature of the disease known as P. has been investigated with some success during modern times, and although no specific cure can be said to have been elaborated, the adoption of precautionary measures is likely to restrict the area of its incidence considerably. The hist. of P. epidemics appears to point to the fact that the bacillus is operative in quite a small area as compared with the widespread attacks of earlier times. P. of the specific bubonic type was undoubtedly known in Europe and N. Africa in the 6th cent., and the series of epidemics known as the Black Death in the 14th cent. appears to have consisted mainly, at any rate, of P. visitations. Observers of the time trace the origin of the Black Death (q.v.) to travellers from the E., probably China. By 1348 practically the whole of Europe was involved, and it is calculated that one-fourth of the pop. of Europe, that is 25,000,000 people, perished in these epidemics.

In 1894 the *Bacillus pestis* was identified by Kitasato and by Yersin, and subsequent investigators have demonstrated that rats may be attacked, and that infection is carried to man by means of the rat flea. On the basis of this discovery, destruction of rats became a standard method of preventing plague. In the insanitary conditions which prevail in native villages the results have often been disappointing. Flea destruction with D.D.T. powder has had some success. In 1910-11 septicaemic and pneumonic P. made its appearance in Manchuria; in this epidemic the infection seems to have been conveyed by marmots, which are trapped for the sake of their fur. Vaccines against P., developed from the original Haffkine vaccine, have been widely used with encouraging results. Unfortunately P. vaccines deteriorate rapidly, so they can only be used within a limited range of the laboratories where they are prepared. However, a stable, dried vaccine is being experimented with, and is likely to prove better than its predecessors. Streptomycin and the sulphonamides have given promising results in the treatment of P., and there is also a serum. The latter is expensive to prepare. See D. Defoe, *Plague in London*, 1665, 1886; T. Dekker, *Plague Pamphlets* (ed. Wilson), 1925; A. M. Campbell, *Black Death and Men of Learning*, 1931; *Present Remedies against the Plague*, 1603 (Newes No. 62, 1665. Ed. Barratt), 1932; A. Fraviel, *Peste de Marseille (1720)*, 1937; and Manson's *Tropical Diseases* 14th ed., 1954.

Plaice (*Pleuronectes platessa*), valuable flat fish which occurs in the northern N. Atlantic and around Brit. coasts, and is taken by the trawl. The mouth is small, the scales smooth and minute; the colour above varies from brown to black with bright red or orange spots and is white beneath. The eyes are on the right side. The lateral line is nearly straight. The average weight is about 3 lb., and though 15 in. is about the average length, specimens twice as large are sometimes caught. The female spawns early in the year, producing an enormous number of buoyant eggs.

Plaids, see DRESS; HIGHLAND DRESS; and TARTAN.

Plaid Cymru (the Welsh Nationalist Party), Welsh political movement dedicated to the triple aim of securing for Wales: (a) self-government within the Commonwealth of Nations as with New Zealand, Canada, etc.; (b) the safeguarding of the culture, language, and economic life of the country; (c) the right to become a member of the U.N. Founded in 1925, P. C. has contested parl. elections in Wales since 1929, but has hitherto failed to gain representation at Westminster. In the General Election of May 1955 the 11 P. C. candidates polled a total of some 45,000 votes. See D. M. Lloyd, *The Historical Basis of Welsh Nationalism*, 1950; D. E. Butler, *The British General Election of 1955*, 1955.

Plain, geographical term applied to a level surface of land at a low elevation from the sea. Extensive tracts of level land at a high altitude are usually called plateaux or table-lands, but in certain cases, such as the P. S. E. of the Rockies, where the elevation from sea-level to a great height is gradual, the term 'plain' is retained. The most characteristic P.s are those which extend over the basin of a large riv., and are caused by erosion and deposition. Of such a kind may be noted the P.s S. of the Himalayas forming the basin of the Ganges, the P.s of the Mississippi, Mesopotamia, the Rhine, etc. P.s may also be due to denudation, such as the sandy wastes of Arabia, and the desert of Sahara in N. Africa. Large tracts of comparatively level land, only broken here and there by cliffs or low hills, are often called by various names, such as the prairies of N. or the pampas of S. America and the steppes of E. Europe.

Plaine des Jarres, large plain 4000 ft above sea-level, 60 m. E. by S. from Luong-Prabang (q.v.) in Laos (q.v.). It is notable on account of the large number of megaliths worked in the form of jars and scattered in groups on the plain.

Plainfield, city in Union co., New Jersey, U.S.A., 15 m. SW. of Newark. It has manufs. of printing presses, machine tools, silk and cotton goods. It was settled in 1684 by Friends, and incorporated in 1869. The Friends' meeting-house dates from 1788. It is the site of Revolutionary War shrines. Pop. 37,500.

Plains of Abraham, see ABRAHAM, PLAINS OF.

Plainsong, **Plain Chant**, system of music used chiefly in the churches of the Rom. Catholic communion for the greater part of the liturgy. In the early Church there were sev. forms of P., but the Rom. form gradually supplanted the others, such as the Ambrosian of Milan, and acquired the name of Gregorian chant on account of the tradition that it was systematised and perfected by St Gregory (q.v.) the Great (590-604). In the 18th cent. there grew up a practice, particularly in France, of introducing grace notes and passing notes into the P. This was done *extempore* by the priest, and in time led to textual corruptions, which were, however, swept away by the official adoption, under decree of Pius X, of the P. version pub. by the Benedictine monks of Solesmes, who photographed numbers of MSS. in the European libraries, collated them, and set the text according to the weight of MS. evidence for any particular version. With the Catholic revival within the Anglican Church P. has been adopted in a large number of Eng. churches. During the period of polyphonic church music, from the 12th to the 16th cents., P. melodies were used as a *cantus firmus* (q.v.) (It. *canto fermo*) in masses and motets to provide a tenor part around which other freely invented parts were woven. See also NOTATION.

Plaintiff. In law the P. is the party who sues in a civil action, the party who is sued being the defendant. In Scotland the parties are styled 'pursuer' and 'defender' respectively. The term P. is not used in reference to criminal proceedings, the analogous party being called the prosecutor, or, impersonally, the Crown or the prosecution, where the proceedings are taken in the name of the Treasury.

Planarian, group of non-parasitic flat worms of the subdivision Turbellaria which, with Trematoda and Cestoda, comprises the group Platyhelminthes. They are usually small, flat, soft creatures, common both in fresh water and in the sea, where they may be found under rocks and stones in pools. Some of them are brilliantly coloured, and a few tropical forms are sev. in. long. A common freshwater P. is black, and may often be seen like a drop of black sealing-wax on the leaves of aquatic plants. It feeds on insects, small molluscs, and lower organisms. The mouth is on the under side of the body; the skin is furnished with the protective vibrating hairs or cilia whence the name Turbellaria is derived. P.s multiply sexually and also by div. From them the parasitic Trematodes (flukes) appear to be derived.

Planck, Max Karl Ernst Ludwig (1858-1947), Ger. physicist, b. Kiel. He was the son of a prof. of constitutional law who was a joint author of the Prussian civil code. He was educ. at Berlin and Munich Univs., and became assistant prof. at Kiel in 1885. In 1889 he was appointed prof. *ordinarius* of experimental physics at Berlin, and from 1913 to 1914 he was rector of Berlin Univ. P. received the Nobel prize (q.v.) for physics in

1918, was made a foreign member of the Royal Society in 1926, and was awarded the Copley medal in 1929. He was invited to England in 1946 for the Royal Society's celebrations on the Newton tercentenary. Kirchhoff, under whom P. had studied, had shown that, in an enclosure where all the objects were at the same temp., the heat radiation was divided between different parts of the spectrum in a way that was independent of their nature. P. set himself to discover the formula relating the energy of particular wavelengths with the wavelengths and temp., using as a guide the accurate measurements made by Lummer and Pringsheim. Thus in 1900 P. initiated the quantum theory (q.v.) now one of the foundations of physics, with applications in nearly every branch of the subject. P.'s works include *Hauptsätze der mechanischen Wärmetheorie*, 1879; *Gleichgewicht-Zustände isotropischer Körper*, 1880; *Prinzip der Erhaltung der Energie*, 1887; *Grundrisse der allgemeinen Thermochemie*, 1893; *Vorlesungen über Thermodynamik*, 1897; *Vorlesungen über die Theorie der Wärmestrahlung*, 1906; *Einführung in die Theorie der Elektrizität und des Magnetismus*, 1922; *Physikalische Rundblicke*, 1922; *Die Ableitung des Strahlungsgesetzes*, 1923; *Das Weltbild der neuen Physik*, 1929; and *Wege zur physikalischen Erkenntnis*, 1933. See H. Hartmann, *Max Planck als Mensch und Denker*, 1938; *Die Entstehung und bisherige Entwicklung der Quantentheorie*, 1920, (Eng. trans. 1922).

Planck's Constant, see QUANTUM THEORY; INDETERMINACY.

Plane, or **Platanus**, small genus of trees (family Platanaceae) with large leaves and lobular or button-like catkins, the female florets being followed by burr-like nuts. The bark of the trunk and main stems flakes off annually in rectangular scales, and this habit and the smooth polish of the leaves cause the hardier species to be excellently suited for culture in smoky tns. The so-called London P. (*P. × acerifolia*), a hybrid, has sycamore-like leaves, and many fine specimens grow in the London squares. *P. orientalis*, the oriental or common P., is a native of the Levant. It has a rounded outline, and the deeply 5-lobed leaf has a wedge-shaped base. Some fine and massive specimens exist in England. *P. occidentalis*, the W. P., button-ball, or button-wood of N. America, has less deeply divided leaves and a looser outline. It is not sufficiently hardy for successful culture in Britain. The timber of the P. is hard, tough, and fine grained, and has many special uses.

Plane, carpenter's cutting and surface-smoothing tool, of which there are many varieties according to the nature of the surface they are required to produce or some peculiarity of construction: (1) P.s for producing smooth surfaces of indefinite width; (2) P.s used to form P. surfaces of definite and usually narrow width; and (3) P.s designed to produce curved or moulded surfaces.

Planting Machine. Planting machines

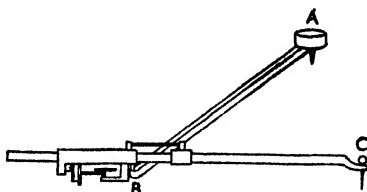
for wood-working are of various kinds, which may be classified into fixed-knife machines having the same action as a hand P. and used for producing a smooth surface on small stuff; and rotary block machines, of which there are 2 types, surface-planers and panel-planers or thicknessing machines. These latter are used to reduce boards or pieces to an even thickness ready for dressing to shape.

Planetaryarium, mechanical device for showing the orbital and rotatory movements of the prin. bodies of the solar system and also of the stars. See ORRERY.

Planetoids, see ASTEROIDS.

Planets (Gk. 'wanderers') were named to distinguish them from the 'fixed' stars, which keep their relative configuration. The ancients counted 7, including the Sun and Moon, Mercury, Venus, Mars, Jupiter, and Saturn. The Sun and Moon are not so reckoned now, but others shown in the table have been added, including the Asteroids (q.v.). All the planets revolve round the sun in elliptical orbits, those whose orbits are within that of the Earth are *inferior*, i.e. Mercury and Venus, those without, *superior* P. Mercury, Venus, and Mars are also classed as 'terrestrial,' being comparable in size, density, and geological stage with the Earth; the others, except Pluto, being larger, less dense, in an earlier stage. The inferior P. show phases like the Moon, appear to 'oscillate' across the heavens, i.e. their apparent motions are direct, retrograde, or stationary (as are those of the superior planets); they sometimes 'transit' at inferior conjunctions; are invisible at inferior conjunction; they are visible only for a few hours at the most, before or after sunset, except in high latitudes. In longitudinal motions the P. do not return on their tracks, but describe loops showing a latitudinal variation owing to the inclinations of their orbits.

Planimeter, instrument for measuring the area of any figure. The best-known form is Amaler's: two metal rods, AB, BC, hinged at B. A sharp point at A is driven into the drawing-board. The rod BC carries at B a wheel whose plane is at right angles to the rod BC, at C a point, the tracer, which is guided round the



PLANIMETER

boundary of the figure to be measured. The hinge moves backwards and forwards over an arc of a circle of radius AB and returns to its initial position. The area of the figure is therefore the area generated by the rod BC. This is measured by l , the length, times the distance covered by the wheel in rolling: $l \times 2\pi \times n$, where r is the radius, n the number of revolutions. The wheel is geared to a dial which records the area. If the length BC is adjustable, the scale can be altered and readings obtained in in.² or cm.² or acres, etc.

Plankton (Gk. *planktos*, wandering), name given by Victor Hensen (1887) to plants and animals possessed of little or no means of independent locomotion and found floating or drifting in water. Many P. organisms are colourless or faintly bluish, inconspicuous, gelatinous, and transparent. Marine P. is much richer

Name	Mean distance from Sun (million miles)	Diameter (miles)	Velocity (m. per sec. at mean distance from Sun	Satellites
Mercury	36.0	3,000	29.7	None
Venus	67.2	7,600	21.7	None
Earth	92.9	7,927 (E), 7,900 (P)	18.47	1
Mars	141.5	4,200	15.0	2
Asteroids	135-400	10-243	11-15	None
Jupiter	483.3	88,700 (E), 82,800 (P)	8.1	12, 4 retrograde
Saturn	886.1	75,100 (E), 67,200 (P)	6.0	9, 1 retrograde
Uranus	1,783	30,900	4.2	5, all retrograde
Neptune	2,793	33,000	3.4	2, 1 retrograde
Pluto	3,666	3,000	2.9	Not known

(E) equatorial (P) polar

Pluto, Neptune, Uranus (generally), and the planetoids except Vesta, and all satellites except the Moon, are invisible to the naked eye. All P. appear as disks through the telescope, whereas no star shows any sensible disk. See ASTRONOMY; BODE; PHYSICAL CONSTANTS; and SOLAR SYSTEM.

than fresh-water P. in both kind and number of species. The number increases in fairly still water, and consequently lakes and ponds have more P. than rivers. The P. plants are mainly diatoms, peridians, and small algae. The animals consist chiefly of Protozoa, Crustacea, Mollusca, Echinodermata, eggs of fish and

other animals, larval, and a few pelagic worms, e.g. *Sagitta*, the arrow worm. Great numbers of the phosphorescent Protozoan, *Noctiluca*, form luminous areas in the sea. The *P.* varies not only seasonally, but also in adjacent small areas and at different depths of water. Much valuable information on *P.* was secured before the Second World War by the Royal Research Ships *Discovery I* and *II*, see DISCOVERY COMMITTEE. See also, FORAMINIFERA.

Plant-eating Beetles, see WEEVILS.

Plant Hormones, or growth-regulating substances, may initiate, inhibit, or accelerate growth activities in various parts of a plant. Charles Darwin postulated their existence in his *Power of Movement in Plants*, 1880. They may be extracted from plant tissues, but are now synthesised in laboratories. First practical use of a plant hormone was made in 1929. Since then over a hundred chemicals have been synthesised which possess the power to regulate plant growth in some way. Correct concentration is important; minute dilutions can cause major growth activities, large amounts can kill plants. The chief practical applications of *P. H.* at present are: (1) to promote rooting in cuttings, etc. The synthetic substances used are usually derived from phenoxy-acetic acid and may be used in powder or liquid form; (2) to induce fruit-formation by unfertilised ovaries, notably in tomatoes, and cucumbers, but also in apples and berry fruits. Substances based on beta-naphthoxy-acetic acid are used for this. Artificially stimulated fruits grow to some size, and are seedless; (3) to delay flower-bud development in fruit trees to avoid frost damage by use of iodo-acetate; (4) to control pre-harvest fruit drop, chiefly in early apples. Alpha-naphthalene-acetic acid (N.A.A.) is effective in this; (5) selectively to control weeds in cereals and lawns; 2-methyl-4-chlorophenoxy-acetic acid (M.C.P.A.), 2:4-dichloro-phenoxy-acetic acid (D.C.P.A.), and 2:4:5-trichloro-phenoxy-acetic acid (2, 4, 5-T.) are widely used; (6) to prevent sprouting on stored potatoes and roots, using alpha-naphthyl-acetic acid. See also GARDENING; LAWNS; WEEDS.

Plant-house, see HOTHOUSE.

Plantagenet, surname used of the Angevin house, which succeeded to the throne of England in 1154 in the person of Henry II, and ruled until the deposition of Richard II (1399). The houses of York and Lancaster, which succeeded, being descended from Edward III, are generally included in the *P.* line. The name is said to have been derived from the custom of Geoffrey of Anjou, father of Henry II, of wearing a sprig of broom (*Planta genista*) in his cap. Since the time of Charles II *P.* has been applied to all descendants of Geoffrey, count of Anjou. It was a personal emblem of Geoffrey, but was never borne by any of his descendants until Richard, Duke of York (father of Edward IV), who assumed it probably about 1448. See J. Harvey, *The Plantagenets, 1154-1485*, 1948.

Plantaginaceae, family of plants, with ribbed or fleshy leaves usually radical, and flowers mostly borne in spikes. Sev. species are common plants in Britain; the 2 Brit. genera are *Plantago* (plantain) and *Littorella* (shoreweed).

Plantain, or *Plantago*, family Plantaginaceae, genus of herbaceous plants which includes 5 Brit. species, some of which are troublesome garden weeds. The greater *P.* or waybread (*P. major*) has radical ribbed leaves and long tapering spikes, bearing purple-anthered flowers; the seeds are used as a food for cage birds. Other species are the hoary *P.* or lamb's tongue (*P. media*), ribwort *P.* (*P. lanceolata*), *P. maritima*, and *P. coronopus*. One of the few species of horticultural value is *P. coriacea*, which bears tall spikes of white flowers. Sev. Indian species have medicinal value.

Plantain Eaters, or *Musophaga*, genus of picarian birds, all of which are African forest birds, characterised by the hind toe being able to turn backwards or forwards, and by the base of the bill being dilated. They all have beautiful crests, which can be elevated or depressed at will. The colouring is blue or green with red primaries, the pigment of which is soluble and is washed out during the rainy season, though quickly renewed.

Plantation, assemblage of planted growing plants, especially trees; also an estate on which sugar, cotton, oil palm, tobacco, etc., are cultivated. The term was originally applied specifically to the Brit. settlements in America, and then to any large estate in N. America, the W. Indies and E. Indies which was cultivated chiefly by Negro or other slave labour, living in distinct communities on the estate under the control of the proprietor or manager. In this sense the term *P.* was synonymous with *colony*, and the first separate organisation in Britain for the central administration of colonial affairs was a committee of the Privy Council, appointed by Order in Council in 1660, 'for the Plantations.' Later in 1660 a separate 'Council of Foreign Plantations' was created by Letters Patent. In 1672 the council was united to the Council for Trade and was known as the 'Council of Trade and Plantations' (see COLONIAL OFFICE). *P.* song denotes the kind sung by Negroes on Amer. P.s. See NEGRO SPIRITUALS. See also FORESTRY.

Planté's Cell, see ACCUMULATOR.

Plantin, Christophe (c. 1520-89), Fr. printer, b. St Avertin, near Tours. In 1555 he set up at Antwerp one of the largest printing houses in Europe. His works were famous for their accuracy, their beautiful workmanship, and finish, and he secured many influential patrons. The most noted of his pubs. is the *Biblia Polyglotta* (8 vols., 1569-73). He also set up printing houses in Leyden and Paris, which were carried on by his sons-in-law. In 1876 the Antwerp house was purchased by the city and opened as the Musée P.-Moretus. One style of printer's type face is named after him. See M. Rooses, *Le Musée Plantin-Moretus*, 1913.

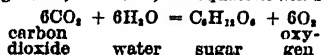
Plants, Distribution of, see ECOLOGY; GEOGRAPHICAL DISTRIBUTION.

Plants, Flowering, see PHANEROGAMIA.

Plants, Parasitic, see PARASITIC PLANTS.

Plants and Planting. The term plant applies to every member of the vegetable kingdom, from the vast forest trees to the minute organisms such as bacteria. Between familiar and higher types of plant life and those of animal life are very obvious differences, but, as the lower members of the 2 kingdoms are examined and compared, the differences become much less obvious, and indeed it is impossible to draw a hard line of separation. In fact, it may be said, the living world, the world of organisms capable of reproducing themselves, is essentially one, the living substance within them being in each case *protoplasm*.

The group of organisms which the biologists have been most puzzled to classify is that known as the Mycetozoa or Myxomycetes, a commonly known member of which is *Plasmodiophora Brassicae*, the cause of club root or finger-and-toe in cruciferous plants. The Myxomycetes have the appearance of being the oldest existing form of life, and there is considerable support for the theory that they have been, or differ but little from, the parents of the whole organic world. Though there are plants which essentially require organic life for their subsistence, it is a general rule that green plants exist for the conversion of inorganic matter into the living substance necessary without exception for every form of animal life. A considerable part of the dry weight of plants consists of carbon, and yet green plants can flourish and increase when they are supplied with a solution of essential food materials from which carbon is absent. These plants are able to take in carbon dioxide from the atmosphere, and, in the presence of light, which provides the necessary energy, to build it into complex compounds. The changes are accomplished with the aid of the chloroplasts, which are usually small rounded structures containing chlorophyll, a green pigment of very complex chemical structure. Some plants, the algae in particular, have large chloroplasts of various shapes, e.g. basin-shaped in *Chlamydomonas*; a spiral ribbon in *Spirogyra*. Usually the first product of the synthesis is a soluble sugar which is rapidly converted into starch, a carbohydrate much more conveniently stored by the plant. Some green plants build other carbon compounds such as oil. The process of synthesising complex carbon compounds from carbon dioxide and water is termed carbon assimilation or *photosynthesis*, and is accompanied by the liberation of oxygen. Assuming that a hexose sugar, such as glucose, is formed, the equation will be:



This process seems to be the very basis of life itself. Chlorophyll is entirely absent from the fungi, and these, and a few higher

plants which have adopted a parasitic or saprophytic life, obtain their carbon, in the form of organic compounds, from living or decaying animals and plants. (See SAPISEPITES; PARASITIC PLANTS.) Many others utilise this source of carbon to a less extent.

Chemical analysis shows that, besides carbon, the following elements are always present in the compounds which form the body of a healthy green plant: hydrogen, oxygen, nitrogen, chlorine, sulphur, phosphorus, silicon, potassium, sodium, calcium, magnesium, and iron. Other elements are frequently present, such as bromine and iodine, which are rarely absent from seaweeds; but a plant can be grown with success in a solution containing those elements mentioned, and apparently sodium silica and chlorine are not indispensable, though almost universally met with. A great variety of chemical changes, known as metabolic processes or metabolism (q.v.), are continually in progress in the plant, breaking down and building up complex compounds, constructing sugars and other carbohydrates from simple inorganic food materials, and converting nitrogen compounds in the soil (or, in the case of leguminous plants, the nitrogen of the atmosphere) into proteins and other complex food materials. These are utilised by the plant in diverse ways, and after its immediate nutritive requirements are satisfied the excess may be stored in various parts of the plant; in vegetative parts the store may be drawn upon for renewed growth after a resting period, or for the production of flowers and seeds. The seeds are stored with sufficient food to enable germination to proceed, and often with enough to allow the young plant to establish itself securely before becoming entirely dependent on its own ability to make food. Trees and shrubs store their reserve material chiefly in the stems, herbaceous perennials in the rhizomes or root-stock, and bulbous plants in the leaves of the bulbs.

It is in the production and storing of the surplus food that most plants become of economic importance; by selection and breeding the storage capacity is greatly increased. A very remarkable instance of this is the sea beet (*Beta maritima*), a perennial plant with a tough, moderately thick fleshy tap-root, common on muddy seashores. From this has been derived the garden beet, the mangold or field beet, and the sugar-beet, in all of which, as in the sugar cane, cane sugar is dissolved and stored in the cell sap.

It is to a large extent due to the lack of an adequate proportion of the various essential plant foods in particular soils that much of the loss of cultivated crops by disease is due, though hereditary susceptibility to disease has been proved by the experiments of Prof. Biffen at Cambridge and of others.

The power of producing new and separate individuals is characteristic of all living organisms. For practical purposes there are 2 distinct modes of reproduction among plants. Sexual reproduction

is the fusion of a male and a female reproductive cell. Amongst many fungi sexual reproduction has hitherto been undiscovered; amongst others it is of a very rudimentary form and there is no physiological sexual distinction, neither between the nuclei which fuse nor the organs or cells containing them. Since the fusion initiates the development of a fructification, it is generally regarded as a form of sexual reproduction. Strictly, special terminology is used to describe the reproduction of such fungi. In the flowering plants, or Phanerogams, the male reproductive cell is enclosed within the pollen grain produced in the stamens. The female reproductive cell lies in the ovule. In one section (Angiosperms) of the Phanerogams the ovules are enclosed in the ovary of the flower; in the other section (Gymnosperms) they are exposed. The ovary is formed from a modified leaf or carpel, the tip of which is called the stigma, and forms a receptive surface for pollen. This is usually brought from another flower by wind, insects (mainly bees), humming-birds in the tropics, rain, and by water currents in the case of aquatic plants. Some flowers, however, have special devices for pollinating their own stigmas if cross-pollination fails. The pollen grain sends out a tube which penetrates the tissue of the stigma, or of the exposed ovule, and continues growth until it enters the ovule and liberates the male nucleus from the tip of the tube. By the fusion of this nucleus with the egg cell in the ovary the act of fertilisation is completed. A number of plants (e.g. rice) are undoubtedly self-fertilised, including some of the commonest weeds, which are thus independent of any cross-pollinating agency.

Vegetative reproduction, the other mode of giving rise to new individuals, consists in the separation, naturally or artificially, of portions of the vegetative organs of the parent. It is an example of a sexual reproduction. The strawberry and many other creeping plants send out runners or stolons, the buds on which become rooted and form separate plants. The potato produces thin underground rhizomes, which thicken into tubers at their tips. This habit of vegetative reproduction is so strongly developed in some plants, e.g. the common couch or twitch, that the tiniest portion of the underground parts of the plant are capable of growth. Of the numerous methods of producing new plants artificially, that by means of a cutting or portion of a stem or leaf is the commonest, and immense numbers of garden plants are increased in this way. Another method is by layering, which consists in bending and pegging down a shoot of a plant into the soil, usually after making an oblique slit or ring from which adventitious roots are produced; this method is used for carnations. Budding, removal of a bud from one plant and its insertion into the stem or stock of another, and grafting, the insertion of a shoot with several buds upon it into a stock, are processes

commonly applied to dicotyledonous plants of a woody nature, such as roses and fruit trees. By this means plants of different species and even of different genera can be united, e.g. the pear on the quince, the tomato on the potato, and the medlar on the hawthorn.

One main div. of the vegetable kingdom is the *Cryptogamia*, or flowerless plants, which have no flowers and reproduce themselves by spores. Among these are the algae, mosses, and ferns. The other main div. is the *Phanerogamia*, or flowering plants, which bear obvious flowers consisting of stamens and pistil and usually a perianth; they reproduce themselves by seeds containing an embryo, and are divided into 2 main groups. Of these the Gymnosperms have the ovules developed directly upon the axis, as in the yew, or upon open carpellary leaves, as in the cones of the pine, fir, and larch. In the Angiosperms the ovules are contained in a closed ovary. This group includes the great majority of flowering plants and is subdivided into the dicotyledons and the monocotyledons, distinguished by the number of cotyledons or seed leaves present. The monocotyledons may usually be distinguished by the internal structure of their stem, the parallel venation of the leaves, and the arrangement of the floral leaves in series of 3. The growth of the plant is accomplished by cell div. (see CYTOLOGY), and the production of additional mechanical supporting tissue as height increases is an interesting feature of plant mechanics (see CAMBIUM). The growth of most plants is considerably influenced by the presence and intensity of light. Many interesting adaptations are revealed by the study of the plant in relation to its habitat. See ECOLOGY; LEAF; MORPHOLOGY; NATURAL ORDER OF PLANTS; TRANSPIRATION. See C. Ballot, *The Art of Grafting and Budding*, 1903; L. H. Bailey, *Manual of Cultivated Plants*, 1924; L. Cockayne, *New Zealand Plants and their Story*, 1927; F. T. Brooks, *Plant Diseases*, 1928; W. R. Peel, *Grassland Management for the Practical Farmer*, 1938; H. Godwin, *Plant Biology*, 1939; H. Nicol, *Plant Growth-Substances*, 1940; G. M. Thomas, *Plant Physiology*, 1940; H. Martin, *The Scientific Principles of Plant Protection*, 1940; J. S. Daker, *Simple Greenhouse Management*, 1940; F. Verdoorn (ed.), *Plants and Plant Science*, 1945; G. D. H. Bell, *Cultivated Plants of the Farm*, 1948; F. R. Irvine, *Some Tropical Plants and their Uses*, 1948; and P. M. Syngé (ed.), *New Plants of the Year*, 1948, 1949.

Planudes, Maximus, see ANTHOLOGY. *Plaquemine*, tn of Louisiana, U.S.A., on the Mississippi R., 85 v. m. WNW. of New Orleans. There is trade in cotton, rice, and sugar, and manufs. of lumber products from cypress wood. Pop. 5750. *Plasma*, see BLOOD.

Plasma, leek-green, feebly translucent variety of chalcodony (q.v.). It is sometimes dotted with white, but when it contains red spots of jasper it is called 'bloodstone' or 'heliotrope.'

Plasmodium (*plasma* and *Gk eidos*, form), plant body or vegetative growth of a slime-fungus or Myxomycete, consisting of a mass of protoplasm, containing many dividing nuclei; is microscopic in some species, but quite large in some. P. lives on decaying organic matter often in soil, producing minute spores. Some are parasitic, e.g. *Plasmodiophora brassicae*, the cause of Clubroot in brassicas.

Plassey, former vil. of Bengal, India, famous as the site of Clive's victory over Suraj-ud-Dowlah, the nawab of Bengal, in June 1757. It is 93 m. N. of Calcutta. Landmarks have largely disappeared, but a mound and a monument mark the position of the Brit. forces.

Plaster, in building, material applied in a plastic state to provide a uniform finish to walls and ceilings; external P. finishes, however, are usually termed *renderings*. P. mixes consist usually of sand and a binding agent, which may be lime, Portland cement, or a calcium sulphate (gypsum) P., or a mixture of lime with either of the others; sometimes gypsum P. is used unsanded, in finishing coats. P. of Paris ($\text{CaSO}_4 \cdot \frac{1}{2}\text{H}_2\text{O}$) is manufactured from natural gypsum ($\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$) by heating to remove part of the water of crystallisation. The powdered product sets hard on mixing with water, expanding slightly as it does so; this property is valuable in making P. casts, ensuring a sharp replica of the mould. For building uses, other ingredients are often incorporated to control setting time and hardness. Gypsum is slightly soluble in water, and is therefore not used externally except in very dry climates. Lime and cement mixes shrink on setting and drying, but are resistant to damp conditions.

Plaster Casting. The fluid plaster is prepared by sprinkling thoroughly dry plaster into a suitable quantity of water. When it just rises to the surface of the water it is well stirred, and then has the consistency of cream. The object from which a mould is first made is well vaselined, oiled, or soft-scaped to prevent adhesion of the plaster, which is then laid on uniformly until the cast is about $\frac{1}{4}$ in. thick. The plaster sets rapidly, and the mould may be lifted off in about 10 min. The mould is sized and covered with soft soap and the plaster poured slowly into the mould, the formation of air-bubbles being carefully prevented. A loop of string or wire is pushed into the plaster for suspension when the mould is nearly full. The mould is chipped away with a hammer and chisel about 12 hrs after filling, except in the case of flat casts, which can be easily lifted off. To obtain sev. copies of an object (in other than flat casts) a 'gelatin' mould or a 'piece' mould can be used, which latter consists of sev. parts which can be bound together for the reception of each cast and then lifted off when the cast has set. In this case the plaster is poured into an aperture left for the purpose.

Plaster moulds are also used for the preparation of bronze, lead, and other metal casts. The moulds are made from

the clay or plaster model by the same method as is used for plaster casts. The metal in each case is heated until liquid and poured into the plaster moulds in the same way as the plaster. This process is also used for terra-cotta casts, but here the clay may be liquid, or of the consistency of butter, in which case it is pressed into the plaster mould by hand. See J. C. Rich, *The Methods and Materials of Sculpture*, 1948.

Plaster of Paris, see PLASTER.

Plastic Surgery, see SURGERY.

Plastics, by definition, at some stage in their hist. possess plasticity and can be made to flow and take up a desired shape. They may be either natural or synthetic (man-made) in origin, but the latter comprise most P. dealt with by the industry, and it is with these almost exclusively that the term has become associated.

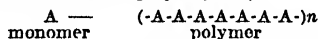
Natural P. were known by the ancients, and some possess qualities which enable them to maintain their popularity for some purposes, e.g. shellac for gramophone records, bitumen for beer-bottle stoppers, despite strong competition from synthetic resins. Celluloid (q.v.), the pioneer synthetic plastic, was discovered by Alexander Parkes at Birmingham in 1865. It was made from nitro-cellulose, camphor, and alcohol, and first appeared under the name of Parkesite, but is now called Xylonite. Cellulose acetate was discovered in attempts to reduce the dangerous inflammability of celluloid. Casein, long known as the protein of milk was the second oldest plastic material, having been originally introduced in 1904. Although these materials and many of the reactions upon which the industry is based have long been known to chemists (styrene was first prepared in 1831, acrylic acid in 1843) it was not until 1910, when Baekeland produced the first phenol-formaldehyde moulding powder, that the foundations of the modern synthetic P. industry were really laid. As Bakelite this material is world-famous.

P. fall into 2 main classes according to their behaviour on heating. Thermoplastics are those which can be repeatedly softened and resoftened by correct heat and pressure treatment, as long as no decomposition or degradation occurs. Thermosetting P. are made permanently rigid by heat, since they undergo an irreversible chemical change. Examples of thermoplastics are most natural waxes and resins, derivatives of cellulose, also synthetic polyethylene, polyvinyl chloride, polymethyl methacrylate, nylon, polystyrene, etc., and their derivatives. The phenolic, amino, and casein P. are thermosetting.

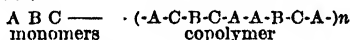
Chemically most P. are composed of carbon combined with various other elements, including hydrogen, oxygen, nitrogen, and chlorine. An interesting and very promising new class is the silicones, which have silicon atoms instead of the carbon atoms of other groups, with corresponding differences in properties. In structure P. are composed of many

similar units which unite to form exceedingly large, chain-like molecules, which may or may not be branched, and each containing many thousands of units. The length and shape of these chain-molecules determine the behaviour of the finished plastic to some extent, therefore they are carefully controlled during manuf. Studies relating chemical structure with physical properties have revealed much, so that it is possible to predict some of the properties of a new material merely from knowledge of its chemical structure.

The units which make up the large or macro-molecules may be all of one species, as in the case of polyethylene,



where many ethylene molecules (C_2H_4) join together by simple addition to form long chains of $-\text{CH}_2-$ groups. This addition process is known as polymerisation, and the resultant is a polymer. The compound possessing the composition represented by the unit is the monomer—in this case it is ethylene. Where units are of 2 or more species, e.g. A, B, C, etc., the chains are made up of mixed species, thus:



the frequency of the various species being dependent on the proportions of the components in the monomer mixture. This product is a copolymer.

In addition to polymerisation, P. are sometimes formed by condensation reactions. Here simple addition does not occur, but the plastic macromolecule and a small molecule, e.g. water, carbon dioxide, alcohol, etc., are formed simultaneously. An example of this type of reaction is the preparation of phenol-formaldehyde resin (see formula 1). Other substances than the monomers are present in the polymer-producing reactions. The most important of these is the catalyst, or accelerator, without which the polymerisation would either not take place at all, or would proceed at an uneconomically slow rate. The catalyst is selected according to the reaction it is to promote, and may be effective for only one reaction, or for sev.

If moulded articles were made from the unmodified polymers they would be dull and unattractive, as most polymers are white, cream, or similar neutral shades. Dyes and pigments are therefore incorporated into the resins. Other additives include fillers, e.g. fibrous asbestos, cotton linters, etc., which increase the strength of P. which tend to be brittle, or which lower the cost by diluting expensive resins with inexpensive materials, e.g. wood flour, paper pulp. Plastic foams may be made by the addition of blowing agents, chemicals which release gas under certain conditions, so producing very light, spongy materials which float easily, e.g. for lifebelts, and which are efficient heat insulators, e.g. for refrigerators. To

combat brittleness, particularly in films and articles where flexibility is important, the addition of small amounts of non-volatile solvents, or plasticisers, is necessary.

The methods used in the fabrication of plastic shapes lend themselves to mass production. For this reason they can be sold cheaply, in spite of the many and complicated processes involved in moulding powder manuf. If supplied as moulding powder, the material is in the form of chips or fine granules, which are used for moulding, extruding, or calendering. Moulds are of 2 main types, compression moulds, in which a known amount of moulding powder is pressed into shape between the hot plates of an hydraulic press, and injection moulds, in which heated plastic is injected through a nozzle into a cooled mould. In extruding thermoplastics the resin is heated, and in its softened form is forced by a specially designed screw through a heated die, and is then cooled. Casting by pouring into moulds is a simple method which can be used where the polymer can be obtained in a sufficiently fluid state to be poured. It has been used for making gigantic statues in New York in 1939, and is the usual method for producing sheets, e.g. Perspex. In calendering powder is fused between carefully spaced, hot rollers from which it is removed as a film or thin sheet. Films are made by extrusion, calendering, solvent casting, or pressing, the particular method being determined by the properties of the plastic employed. Often P. are available as blocks, sheets, or rods which can be machined, cemented, drilled, sawn, or softened by heat and shaped into any desired final form.

The following are a few individual P. as representative of the main types produced by the industry.

Phenol-formaldehyde (formula 1) is prepared from phenol, or one of its homologues, by condensing it with formaldehyde in the presence of an acid catalyst. It forms a resin which, if subjected to a short heat-pressure cycle, sets to a hard, infusible, but rather brittle moulding. The general-purpose moulding powder contains wood flour, paper pulp, cotton linters, or asbestos fibres, also colouring matter and other minor constituents. As black or dark colours are usually produced, the applications for which this substance, so well known as Bakelite, is used are more utilitarian and less decorative than for some other P. Examples are ashtrays, beakers, electric-light fittings, telephones, door-knobs, clock and radio cases, etc. In the plywood industry this resin is the adhesive used to bond the wood layers together. Other forms are cold-setting adhesives, paint and varnish resins, and casting resins for both decorative and engineering purposes.

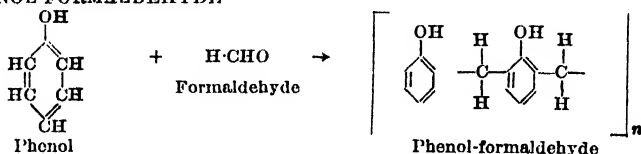
Urea-formaldehyde resins (formula 2) are formed by the condensation of aqueous solutions of urea and formaldehyde without the application of external heat. Fillers, e.g. paper pulp or wood flour, are

then added. They resemble phenol-formaldehyde resins, but have unlimited colour possibilities, although inferior resistance to water. The most important use for urea-formaldehyde moulding powder is for manuf. into decorative articles. Other applications are stoving enamels,

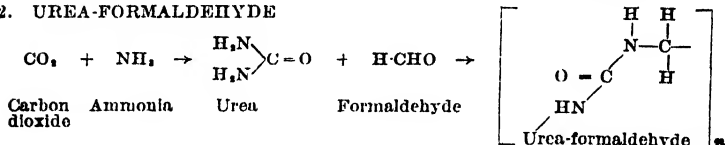
laminating agents, and cold-setting adhesives.

Casein is the protein of milk and is derived from it by coagulation with rennet. The precipitated particles are removed, washed with water, air-dried, and ground to fine granules. These are

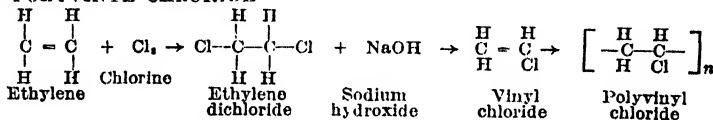
1. PHENOL-FORMALDEHYDE



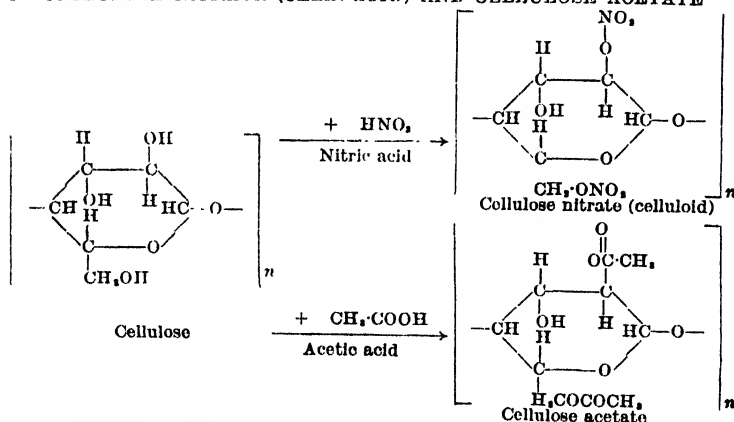
2. UREA-FORMALDEHYDE



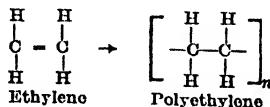
3. POLYVINYL CHLORIDE



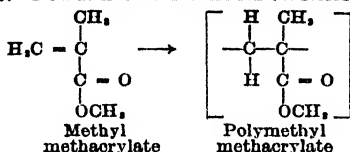
4. CELLULOSE NITRATE (CELLULOID) AND CELLULOSE ACETATE



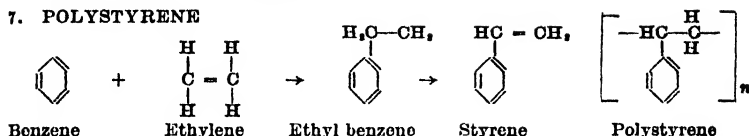
5. POLYETHYLENE (POLYTHENE)



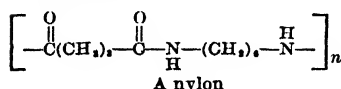
6. POLYMETHYL METHACRYLATE



7. POLYSTYRENE



8. NYLON



Above and opposite
 FORMULAE OF EIGHT TYPES
 OF PLASTICS

mixed with water, dyes, and pigments before being extruded as rod. Casein is thermoplastic until it is treated with formalin, which makes it infusible and increases its water resistance. Casein maintains its popularity because of its infinite colour range and special effects, e.g. imitation horn, shell, mottle, and metallic finishes, in addition to its cheapness and ease of working, although its water resistance is poor. Casein rods and sheets are available, and are fabricated and finished as buttons chiefly, also toys, radio and electrical parts, knitting-needles, buckles, hair-slides, etc.

Phenol-formaldehyde, urea-formaldehyde, and casein are all thermosetting materials, as are melamine-formaldehyde, alkyd and allyl and furane resins.

Laminates or reinforced laminated P. are distinct from the moulded products. They are built up from a number of relatively thin layers, and those that are produced under high pressures owe their properties largely to the fibrous materials which are bonded into a solid mass by an impregnating resin. 'Formica' is an example. The difficulties of these high pressures were eliminated by using resins of the polyester and epoxide type. They form no water during the pressing, and thus have no disruptive effect on the laminate. The pressures needed therefore are low and sufficient only to keep the material tightly pressed in sheet form.

Polyvinyl chloride (formula 3) is formed by the polymerisation of vinyl chloride, a gas, under heat and pressure. The polymer resembles rubber in its properties, is a good electrical insulator, resistant to many chemicals, and non-inflammable. It can be moulded, extruded, and calendered in a wide colour range and in many grades of stiffness, both with and without

plasticisers. Its main uses are as wire and cable sheathing, flexible sheeting for curtains, mackintoshes, belts, and in shoe manuf. Where chemical resistance is important, e.g. petrol hose pipe, chemical plant linings, etc., it finds many applications. Polyvinyl chloride is also used extensively for coating fabrics, e.g. leatherscloths.

Cellulose nitrate and *cellulose acetate* (formula 4) were early discovered polymers derived from wood or cotton linters treated with the appropriate nitric or acetic acid. Cellulose nitrate, or celluloid, was widely used, but its great inflammability was a serious disadvantage, and it has been largely replaced by the less inflammable cellulose acetate. As a solution, the latter is used for rayon production, also for lacquers, varnishes, and coating compositions. It is commonly used for moulding every class of article.

Polyethylene (formula 5) is a white, translucent hydrocarbon obtained from ethylene by polymerisation under very high pressure and temp. It is light, tough, and flexible, and possesses high resistance to water and chemicals, hence its wide use as a material of construction for the chemical industry for pipes and linings. Its outstanding electrical characteristics, combined with satisfactory mechanical properties, make it pre-eminent in the field of electrical insulation, especially for high-frequency and high-voltage work. The polymer can be injection and compression moulded, extruded, cast, and sprayed, and it is available in many forms, including powder, sheet, rod, and film.

There are also the fluorine P. which are related to polyethylene but contain fluorine in place of hydrogen. This

confers extreme chemical inertness, non inflammability, very high softening point (above 600° F.), and moisture proofness. Two polymers are in existence. One is polytetrafluoroethylene ('Fluon,' 'Teflon'), which is a wax-like material used for articles requiring a wide range of temp. and withstanding chemical and solvent action. The other is polytrifluorochloroethylene ('Kel-F'), which contains less fluorine than 'Fluon' and has a lower softening point. Its safe temperature range is from 320° to 390° F.

Polymethyl methacrylate (formula 6) is an organic glass derived from acrylic acid, made from petroleum by a series of complicated processes. Its trade name in Britain is Perspex. It possesses excellent optical clarity, attractive appearance, high mechanical strength, and dimensional stability. It can be obtained as sheet or rod, which can easily be shaped when hot, also as an injection moulding powder. Its chief applications are in the aircraft industry, for surgical instruments, where its unusual property of conducting light around corners is utilised, for lighting fittings, brush backs, trays, picnic ware, toys, etc. It is available in transparent and opaque forms, each in a wide colour range.

Polystyrene (formula 7) closely resembles polymethyl methacrylate and is used for many of the same applications. Methyl methacrylate is preferred in the aircraft industry, and styrene in the electrical industry, where its excellent electrical properties and lower water absorption give it an advantage. Styrene is made from benzene and ethylene, i.e. from coal and petroleum. It is very popular in the U.S.A. owing to its low cost and ease of moulding.

Nylon (formula 8) is the generic term given to long-chain synthetic polyamide resins which have recurring amide groups as an integral part of the main polymer chain. The various nylons are products of the reactions between polybasic acids and poly-functional amines, carried out under carefully controlled conditions of pressure and temp. The main outlet for nylon is as a fibre for spinning and for manu. into textiles and ropes. In the moulded form it is translucent, ivory white in its unmodified form, but can be coloured. Mouldings possess toughness, abrasion resistance and they can be sterilised in boiling water, so nylon is suitable for domestic and nursery items. Other articles include combs, belts, self-lubricating bearings, valve-seats, packaging film, fishing lines, and brushes for domestic and industrial use. Injection moulding and extrusion are the main methods of processing. (See also NYLON.)

The above P. do not represent a comprehensive list of all those available, but are merely representative of the more important types. New materials are constantly being developed in an ever-widening search for better products.

Even the few examples which have been briefly discussed above serve to show the great diversity of properties and appli-

cations existing in the field of P. They may be used to build houses, make furniture, decorate rooms, and for clothing; food may be served in plastic plates on plastic tablecloths, and may have been wrapped in plastic film, or have come from plastic-lined tins and so have been protected from contamination. P. are used both in work, for telephones, corrosion resistant pipes and vessels, radar, cables, protective clothing, and in leisure, for fishing lines and tennis racquets (made from nylon gut), billiard balls, table-tennis balls, radio sets, and films.

P. have certain limitations, however, e.g. thermoplastics are scratched easily and are unsuitable for use at temps. above 212° F., though some special types may be exposed to higher temps. without harm. Thermosetting resins tend to be brittle. The most careful consideration is needed therefore in choosing a suitable

the use of wrong materials, which has been responsible for most of the complaints against plastic products. P. have properties which make them superior to those materials for which they were originally supposed to be a substitute. They stand on their own merits; they may even be tailor-made to suit special purposes, should it be worth while. The industry is still in its infancy.

See L. M. T. Bell, *The Making and Moulding of Plastics*, 1936; K. Brandenburger, *Processes and Machinery in Plastics Industry*, 1938; H. R. Simonds, *Industrial Plastics*, 1940; D. W. Brown, *Handbook of Engineering Plastics*, 1943; H. Barron, *Modern Plastics*, 1945, 1949; F. H. Lambert, *Moulding of Plastics*, 1948; J. M. Edwards, *Elementary Plastics*, 1949; E. G. Couzens and V. E. Varley, *Plastics in the Service of Man*, 1956 (Pellican).

Plata, Río de la, or River Plate, estuary of the Paraná and Uruguay R.s., on the E. coast of S. America, discovered by Juan Díaz de Solís in 1516. Its total length is estimated at nearly 2300 m., and with its numerous tribes it drains the whole of Paraguay, most of the Argentine, and large parts of Uruguay, Bolivia, and Brazil. The area of its drainage basin is estimated at about 1,500,000 sq. m. The estuary is shallow (5-10 fathoms) and is gradually silting up. It was in the battle of the R. Plate (Dec. 1939) that the German pocket battleship *Admiral Graf Spee* (q.v.) was scuttled by order of Hitler to avoid meeting the attack of Brit. cruisers.

Plataea, anct city of Boeotia. At an early period the Plataeans deserted the Boeotian confederacy and placed themselves under the protection of Athens, and when the Persians invaded Attica (490 BC) they sent 1000 men to the assistance of the Athenians and fought on their side at the battle of Marathon. Ten years afterwards (480) their city was destroyed by the Persian Army under Xerxes at the instigation of the Thebans, and the place

was still in ruins in the following year (479) when the memorable battle was fought in their ter. in which the Persian Mardonius was defeated and the independence of Greece secured. In consequence of this victory, the ter. of P. was declared inviolable. It now enjoyed a prosperity of 50 years, but in the third year of the Peloponnesian war (429) the Thebans persuaded the Spartans to attack the tn, and after a siege of 2 years at length succeeded in obtaining possession of the place (427). P. was now razed to the ground, but was again rebuilt after the Peace of Antalcidas (386). It was destroyed the third time by its inveterate enemies, the Thebans, in 374. It was once more restored under the Macedonian supremacy.

Platanus, see PLANE.

Plate-armour, see ARMOUR.

Plateau, or **Tableland**, broad, level area of land in a somewhat elevated position. Two of the most noteworthy P.s are that in Tibet flanked by the Himalayas and called 'the Roof of the World' and that in the Lake Titicaca dist. of the Peruvian Andes, this latter having an area 3 times that of England.

Platen, see PRINTING.

Plateresque Architecture, see SPANISH ARCHITECTURE.

Plating, Electro-, see ELECTRO-METALLURGY.

Platinum (Pt; atomic number 78; atomic weight 195.2), metallic element, originally found in gold mines of Darien, but now obtained from Russia, Brazil, Australia, Tasmania, and S. Africa. It occurs, only native, in grey granules containing gold, copper, or iron, and some of the similar metals such as iridium, rhodium, osmium, etc. Ingots are prepared in 2 ways: (1) The ore is heated and digested with acids, and then heated with nitric and hydrochloric acids (*aqua regia*) and the dissolved P. precipitated by ammonium chloride; the precipitate is then heated and the P. forms as a spongy mass, or it is fused in lime crucibles. (2) The ore is smelted with galena and litharge, and the P.-lead alloy formed is decanted, cast into moulds and cupelled, and then fused in the oxy-hydrogen furnace. P. has a blue or greyish white metallic lustre, is very ductile and malleable, with great tenacity; it is very heavy, sp. gr. 21.4, and its melting-point is 1755° C.; it welds at a red heat, its coefficient of expansion is low and allows sealing into glass vessels. This, and the fact that it is unaffected by the atmosphere and resists any single acid, cause it to be largely used in laboratories, and for electrical appliances. It is, however, corroded by chlorine, sulphur, phosphorus, by heating with alkalis, especially with the nitrate and hydroxide of potassium. It forms alloys with most of the metals, and they are more easily fusible, lead and bismuth alloy very readily, while iridium and rhodium alloys are more highly resistant to heat, for which reason they are used in pyrometers. Spongy P., already mentioned, is prepared by heating

various of the compounds of P., and is used commercially in the manuf. of sulphuric acid, by virtue of its property of causing heated oxygen and sulphur dioxide to combine on contact; oxygen and hydrogen are also combined, a jet of hydrogen impinging on the sponge, igniting spontaneously. This is used in self-lighting devices for burners, and also in the 'Döbereiner' lamp. P. forms 2 oxides, sulphides, chloride, the platinous oxide (PbO), platino oxide (PtO₂), etc. Platino chloride (PtCl₄) is formed by solution in *aqua regia* and evaporation with chlorine. Hydrochloroplatinic acid (H₂PtCl₆) is obtained from the solution; it is a useful reagent for potassium, ammonium, and the amines. Potassium chloroplatinite reduced from the higher salt is used in photography, platinotype prints having the advantage of complete permanence. Fluorescent screens for X-rays are prepared with barium platino-cyanide. Owing to the permanency and decorative use of P., it is used in making jewellery, especially in the setting of diamonds.

Platinum-black, finely divided form of platinum, is prepared from platino chloride by reduction, e.g. by boiling with excess of carbonate of soda and grape sugar, or by adding alcohol to a boiling solution of platino chloride and caustic potash. It has the power of occluding and condensing oxygen and hydrogen; it will absorb 100 times its own volume of oxygen. *Platinised asbestos* is a deposit of the powder on asbestos used in the manu. of sulphuric acid; oxygen and sulphur dioxide are combined with the formation of trioxide, from which the acid is formed by solution. *Colloidal platinum* is a suspension of extremely fine particles of platinum in water.

Platinum Resistance Pyrometer, see under PYROMETER.

Plato (Gk *Platōn* = broad-shouldered), surname of Aristocles (428-347 BC), Gk philosopher, b. Athens, the son of Ariston and Perictione, who were both of noble family. P. received a good education; he seems to have developed his body no less than his mind, for he was a sufficiently good gymnast to contend in the Isthmian and Pythian games. During his youth he wrote verse of several kinds, and some pieces in the *Greek Anthology* are attributed to him. At the age of about 20 P. attached himself to Socrates (q.v.), to whom he remained devoted until the latter's death in 399. Then he visited Megara, Cyrene, Egypt, and Sicily, where he became acquainted with Dionysius I, tyrant of Syracuse. In 386 he returned to Athens, and numbers of eager students flocked to his Academy about a mile from the city. Here he remained permanently, except for two more visits to Sicily. The first of these took place on the death of Dionysius I in 367, in the hope of persuading the new tyrant, Dionysius II, to found a colony which should be ruled according to laws devised by P. himself. His last journey (361) was made in an attempt to reconcile Dionysius with his uncle Dion.

He was unsuccessful, and barely escaped with his life.

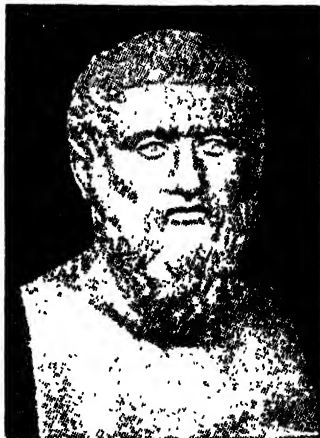
P.'s works, all of which appear to have survived, consist of dialogues, in all of which (except the *Laws*) Socrates is an interlocutor. After the author's death his MSS. were preserved in the Academy, but a complete copy was afterwards lodged in the Alexandrian Library by Demetrius Phalereus (d. 283 BC). There has been much dispute among scholars as to the authenticity of some parts of the Platonic canon: the dialogues entitled *Alcibiades I* and *II*, *Theages*, *Erastae*, *Chilophon*, *Hipparchus*, and *Minos* are undoubtedly spurious. Of the *Epistles*, the authenticity of VII and VIII is fairly well established; I and XII are probably not genuine; upon the remainder opinion is still divided.

P. was interested in many aspects of life, especially in moral values and political and social institutions; but all these things turned ultimately upon his metaphysical beliefs which are embodied in his gradually-evolved 'Theory of Ideas,' to which he was originally led by a variety of influences (see Aristotle, *Metaphysics*, A. vi; M. iv). The Ideal Theory is an attempt to combine two opposing views. The disciples of Heraclitus taught that all things are in a perpetual flux, a doctrine that was modified by Protagoras into the dogma, 'the individual man is the measure of all things.' On the other hand, there was the Eleatic doctrine that all is *one*, and that there is no multiplicity, that this one is immutable, and that there is no change. These views were combined by P. by his differentiation of the real and the sensible. In a famous passage of the *Republic* (Bk. vii) he likens the human race to men who are prisoners in a cave beneath the ground, chained, with their backs towards a fire, gazing at the shadows on the wall and mistaking them for realities. The education of the philosopher is represented by the toilsome struggle of some of these prisoners to reach the outer world and the clear light of the sun. According, then, to the Platonic doctrine, the things which we perceive, the objects of the sensible world, are not the objects of philosophical reasoning. But all these sensible objects have some feature in common. For example, from our personal knowledge we can have cognisance only of individual men, yet we have an abstract conception of Man. We see numbers of trees, yet we must have an abstract conception of the nature of a tree to enable us to describe so many varying things by the same term. To these general terms, the abstract conceptions of visible objects, P. gave a real existence; in the words of Aristotle: 'Those Intelligible Essences he called Ideas; adding that sensible objects were different from Ideas and received from them their names; for it is in consequence of their participation (*kata methezin*) in Ideas that all objects of the same genus receive the same name as the Ideas.' P.'s theory of Ideas, however, had a lasting effect upon W. culture. Through the neo-Platonists it dominated all philo-

sophical and theological thought until the scholastics founded their doctrine on the system of Aristotle. Further, the purely metaphysical theory involved the physical theory of natural kinds; but the two theories were not inseparable. Spesippus and Aristotle both firmly rejected the metaphysical theory, though it had provided a basis for their classifications in zoology and botany.

The authentic dialogues (not in their order of composition, which cannot be accurately determined): *The Apology*, *Charmides*, *Cratylus*, *Critias*, *Crito*, *Euthydemus*, *Euthyphro*, *Gorgias*, *Hippias Major* and *Minor*, *Ion*, *Lysis*, *Menexenus*, *Meno*, *Parmenides*, *Phaedo*, *Phaedrus*, *Philebus*, *Politicus*, *Protagoras*, *Republic*, *Sophistes*, *Symposium*, *Theaetetus*, *Timaueus*. Of these *Laws* is definitely the latest. As for the remainder, so far as it is safe to venture an opinion, we can only say that *Philebus*, *Politicus*, *Sophistes*, *Theaetetus*, and *Timaueus* are late.

The bibliography of Plato is extensive. The Aldine edition was printed at Venice in 1513; the best modern edition is that of J. Burnet (1899-1907). The complete trans. by B. Jowett (3rd. ed., 1892) is eminently readable though not always accurate. Editions and trans. of separate



PLATO
Vatican

(or groups of) dialogues are very numerous. See A. E. Taylor, *Platonism and its Influence*, 1925, and *Plato: the Man and his Work*, 1926; C. Ritter, *The Essence of Plato's Philosophy* (trans. A. Allen), 1933; R. Demos, *The Philosophy of Plato*, 1939; G. C. Field, *Plato and his Contemporaries*, 1940; Sir David Ross, *Plato's Ideal Theory*, 1951.

Platonov, Sergey Fëdorovich (1860-1933), Russian historian, prof. at St

Petersburg Univ. His chief field of research was the Time of Troubles (see TROUBLES, TIME OF) in 17th-cent. Russia. His *Lectures on Russian History* (10th ed. 1917) (Edg. History of Russia, 1925) was very popular as a text-book. P. played a leading role in the intellectual opposition to the Communist regime and vigorously protested against the Communist falsification of hist. He was arrested, removed from the Academy of Science, and d. in banishment.

Platoon (Fr. *peloton*), in the Brit. Army, signifies the sub-units into which a company of infantry is divided; in the U.S. Army it means also a similar sub-unit of cavalry and of some other arms. In origin the P. was the fire-unit of infantry, and the tactics of the 18th cent., and hence the ceremonial drill of to-day, are based on 'P. firing.' The Brit. Army Infantry P. is commanded by a subaltern, who is assisted by a sergeant; it is divided into 3 light machine-gun sections, each about 7 men strong, and commanded by a corporal, and a headquarters section comprising the 2-in. mortar and rocket launcher teams (2 men each), a signaller, a runner, and an orderly: total strength about 30 all ranks.

Platt-Deutsch, see GERMANY, Language and Literature.

Platte River, formed at North Platte, Nebraska, U.S.A., by confluence of the North Platte R. and the South Platte, and flowing 310 m., mainly E., to the Missouri R. 15 m. S. of Omaha. The P., the N. P. (680 m. long from the Park Range of the Rocky Mts in Colorado), and the S. P. (450 m. long from near Leadville, Colorado) contain many dams for flood control and irrigation.

Plattensee, see BALATON.

Plattsburg, co. seat of Clinton co., NE. New York, U.S.A., at the mouth of the Saranac R., 140 m. N.E. of Albany. It has a commodious harbour and extensive water-power, and among its industries are flour and saw mills, pulp and paper factories, machinery, leather goods, razor blades, and concrete blocks. It is an important military station, and possessed some of the largest barracks in New York, which were converted (1946) into Champlain College for veterans. Pop. 17,738.

Platyhelminthes, or Flat Worms, lowest and simplest phylum of the worm-like animals. They are practically all hermaphrodite, and include some of the most important internal parasites, such as tape worms and the liver fluke. They are divided into three classes, of which one, Turbellaria, is non-parasitic (see PLANARIAN). The others are Cestoda and Trematoda. The former contains the tape worms, which in the adult forms have long, flattened, ribbon-like segmented bodies, and a 'head,' or scolex, usually provided with hooks and suckers. They have no mouth and no digestive canal, absorbing nourishment by the whole surface of the body. Besides numerous Cestode parasites of mammals and birds, some are parasites of fishes. The Trematodes have non-segmented, flat-

tened, oval, or lanceolate bodies, with a mouth and digestive canal. The most harmful parasite of this class is *Distoma hepaticum*, the liver fluke (q.v.). See PARASITES; TAPE WORMS.

Platypus, Duck-billed, see DUCK-BILLED PLATYPUS.

Plauen (Im Vogtland), Ger. tn in the dist. of Karl-Marx-Stadt, on the White Elster, at the NW. foot of the Erzgebirge, 42 m. SW. by V. of Karl-Marx-Stadt (q.v.). It is the cap of the Vogtland, and has a 12th-cent. church and a 13th-cent. castle. Its textile industry dates from the 15th cent., and it has also steel and engineering manufs. Pop. 90,000.

Plautus, Titus Maccius (c. 254-184 BC), Rom. dramatist and comic poet, b. Sarsina in Umbria. The particulars of his life are somewhat obscure, but his early years seem to have been marred by poverty. He began writing plays about 223 BC, and 21 of these have survived. They are all adapted from the new Attic comedy, but are thoroughly Rom. in spirit. P. cannot be described as a dramatist of the first rank, but he is almost unsurpassed as a comic writer. He was imitated by Dryden, Addison, Lessing, and others; his *Aulularia* inspired Molière's *L'Avare*; and Shakespeare based his *Comedy of Errors* on the *Menæchmi*. There is a complete ed. of the plays by W. M. Lindsay (1904) and a text with trans. by P. Nixon (5 vols., Loeb Library, 1916-38). See T. Frank, *Life and Literature in the Roman Republic*, 1930; C. D. Buck, *A Chronology of the Plays of Plautus*, 1940; W. Beare, *The Roman Stage*, 1950; G. E. Duckworth, *The Nature of Roman Comedy*, 1952.

Play, Pierre Guillaume Frédéric L., see LE PLAY.

Playa, a stretch of mud flats, formed in desert regions on the site of an ephemeral P. lake which contains water only after the rare periods of rain.

Player-piano. The first P., invented in 1842, has little resemblance to the highly artistic instrument of to-day, which is the development of the Angels patented in 1897 in the U.S.A. by H. White of Meriden, Connecticut.

Originally built in cabinet form to stand in front of the piano, the modern instrument is now contained completely within the case of the piano. The player action consists of a system of valves and pneumatics, a vacuum chest, and exhausters and reserve. There is one set of valves and pneumatics to each note, connected by a tube to an aperture in a tracker-bar, over which a perforated music roll is made to pass by means of an air-motor operated by power obtained by pedalling the instrument. This tracker-bar is usually mounted in the centre of the upper part of the piano over the keyboard. As the music roll traverses the tracker-bar the perforation exposes an aperture in the bar, and an inrush of air inflates the primary pneumatic. This starts a train of operations of valves and pneumatics until the power (pneumatic, inflated, or collapsed according to the

system used) actuates the lever connected to the prolonge of the piano action and the note is struck. Expression valves are provided for bass and treble control, and in some instances individual note control permits proper accentuation of notes or chords, with degrees of light and shade and tone colour. Tempo regulation is by means of the Metronome lever connected to the air-motor. In one instrument a refinement is provided by a phrasing lever coupled direct to the motor governor, permitting fine shades of tempo variation, and thus avoiding a strictly mechanical time.

In a different category is the Reproducing P., pneumatic in its method of operation, as is the foot-blown instrument described above, but constructed with a variety of extra expression control boxes and governors, and requiring the use of specially recorded music rolls, in many instances played by world-famous pianists; a small silent-running electric motor is usually fitted to provide the power, but the action of these instruments is still purely pneumatic.

Playfair, John (1748-1819), geologist and mathematician, b. Benvie, near Dundee. In 1785 he became prof. of mathematics at Edinburgh Univ., and in 1805 was transferred to the chair of natural philosophy there. Elected a Fellow of the Royal Society in 1807, he wrote *Elements of Geometry*, 1812-14; *Outlines of Natural Philosophy*, 1812-16; and *Illustrations of the Huttonian Theory of the Earth*, 1802. See memoir by F. Jeffrey in *The Works of John Playfair*, ed. by J. G. Playfair, 1822.

Playfair, Sir Nigel (1874-1934), actor-manager, b. London; son of Wm S. Playfair, M.D. Educ. at Winchester, Harrow, and Oxford, he was called to the Bar in 1900 and practised. Gaining dramatic experience with the O.U.D.S., the Old Stagers, and the Windsor Strollers, he made his professional debut at the Garrick Theatre in 1902. In 1918 P. assumed the management of the Lyric Theatre, Hammersmith, famous for its revival of old plays. He wrote *The Story of the Lyric Theatre*, 1925, and *Hammersmith Hoy*, 1930.

Playing-cards, see CARDS, PLAYING.

Playing Fields Association, National, see NATIONAL.

Plays, see CENSORSHIP OF THE DRAMA; DRAMA; RADIO DRAMA; THEATRE; and individual articles on playwrights and actors.

Plea, in law, a term used to denote either generally (1) an action or criminal prosecution, or specifically (2) that which is pleaded or alleged by a party to an action or defendant in criminal proceedings in answer to the allegation of the other party or of the prosecution. In a third sense P. was the technical term before the Jurisdiction Act, 1875, for what is now called in the language of civil pleadings a *defence*. As to (1): This use is now obsolete. The old commentators, like Blackstone and Stephen, regularly divided P.s into P.s of the Crown, i.e. crimes in

respect of which the Crown proceeded on behalf of the public in the king's bench court, and common P.s, or actions between subject and subject tried in the court of common pleas (q.v.). As to (2): Allegations in pleadings (q.v.) are either substantial, that is, go to the merits of the cause of action, or are merely dilatory, that is, offer some merely formal objection to the proceedings. Dilatory P.s are now either obsolete or superseded by interlocutory proceedings. Substantial P.s in civil actions are generally classified into: (1) Traverse (q.v.); (2) Confession and avoidance (q.v.); and (3) Objections in point of law. In criminal procedure P.s are either: (1) Dilatory (to the jurisdiction and in abatement); these are seldom resorted to at the present day, for relief can be obtained in other ways, such as by writ of error or moving in arrest of judgment, or, again, the court will cause the indictment to be amended. (2) Special P.s in bar: (a) *Autrefois acquit*, i.e. a plea that the accused has already been acquitted of the charge; (b) *Autrefois convict*, a P. of former conviction on the same charge; (c) P. of pardon by the Crown. (3) The general P. of not guilty.

Pleadings, written documents of the parties to an action which do not set out all the evidence in support of their cases, but merely the point or points in issue between them. The development of P. in actions in Eng. law can be traced back to the Middle Ages. Formerly P. were oral, and the parties either personally or by professional pleaders would conduct an argument before a judge, whose function was to compel them to reduce to essentials the point or points at which they were at variance and which constituted the questions requiring a judicial decision. The parties were then said to be 'at issue,' and they were ready to go before the Court for the disputed questions of fact or law to be tried. 'The question to be decided came to be called 'the issue between the parties.' In the early days the 'parol alteration' of the pleadings was recorded officially on a parchment roll (i.e. the record of the court). Later each pleader borrowed the roll in turn and himself entered his allegations and counter-allegations on it; still later they were drawn up on paper and interchanged, and when an issue was finally arrived at the P. were entered on the parchment roll. The rules of pleading became so involved that the substance of the allegations in P. became subordinated to the technical requirements of form. The modern straightforward and common-sense form of pleading came into existence as a result of the procedural reform of the Common Law Procedure Acts, 1852-60, and the Judicature Act, 1873. P. in actions usually consist of statement of claim and defence, but there may also be a counterclaim and reply.

Pleasure, see EMOTION; ETHICS; HEDONISM.

Plebeians, **Plebs**, or **Plebes**, commonalty of anc. Rome, including all citizens not belonging to the patrician *gentes*. They were originally mainly derived from the

conquered Latins settled on Rom. ter. Servius Tullius first made them serve in war and granted them the right of voting in the Comitia Centuriata with the patricians. Mommsen considers that the P. were simply the *clientes* (dependents), looked at as being deprived of political rights. Under the rep. between c. 510 and 286 BC, the long struggle for equality of rights between P. and patricians continued. It was marked by the estab. of *tribuni plebis* (491 or 493), and gradually the P. gained admission to all the chief secular and religious offices of state. The name later was associated with the lower ranks of the people, as opposed to the *nobiles*, holders of office, and hence was used for populace or mob. See Mommsen, *Römische Forschungen*, i; *Römische Staatsrecht*, lii.

Plebiscite (*plebiscitum*, ordinance, decree), in anct. Rom. hist., a law enacted by the plebs in their *comitia tributa* or *concilia plebis* (estab. 449 BC) on the rogation of a tribune (first created 491 or 493). Originally these resolutions needed confirmation by the senate, but later they came to be binding on the whole nation (*universus populus*), as finally stated in the *Lex Hortensia* (286 BC). In modern politics a P. is an expression of popular opinion obtained by vote from all the electors of the state. In Great Britain the principle of the P., which is often confused with referendum (q.v.), is sometimes applied by local authorities over questions of local interest such as rating. In the national sense, however, P.s have been employed by the League of Nations under a section of the treaty of Versailles to decide the national destiny of areas which were involved in peculiar difficulties. In 1935 a P. took place in the Saar dist. to discover the wishes of the inhab. regarding their nationality, and, under the growing influence of National Socialism, it resulted overwhelmingly in favour of Ger. as against Fr. nationality. In 1955 a referendum rejected a Franco-Ger. agreement for 'Europeanisation' of the Saar (later it was agreed that the Saar should return to Germany, and it did in 1957). In 1939 the Soviet Gov. held a P. in the E. provs. of Poland, in order that the inhab. might actually or apparently decide on the question of annexation (see *POLAND*). In a P. in 1946 in Greece a majority of more than 2 to 1 opted for the king's return.

Pleiotognathi, see **TELEOSTII**.

Pledge, see **PAWN BROKER**.

Pleiade, name applied to a group of 7 Fr. poets of the 16th cent., who united to reduce Fr. literature and language to a classical form. They were Ronsard, Du Bellay, Baif, Jodelle, Pontus de Thyard, Dorat, and Belleau. See G. Wyndham, *Ronsard and La Pleiade*, 1906.

Pleiades, the 7 daughters of Atlas and Pleione, b. on the Arcadian Mt. Cyllene. Their names, Alcyone, Electra, Merope, Maia, Taygeta, Celaeno, and Asterope, with those of their parents, have been applied since Riccioli (1665) to the 9

brightest stars of the group in Taurus. This group of stars, which begins to appear above the horizon in the late evenings of autumn, forms a good test for the eyesight. Normal eyesight can detect 6 but those endowed with keen sight can see 7 or even more. A small telescope or a pair of binoculars shows many more, and the astronomer's photographic plate has revealed thousands. The brightest star in the cluster— γ Tauri, also known as Alcyone—is a quadruple and is a beautiful object when viewed through even a small telescope. The group has a number of nebulae and is surrounded by a fine nebulous mass extending out a considerable distance.

Pliocene, see **PLIOCENE**.

Pleistocene Period, see **GLACIAL OR PLISTOCENE PERIOD**.

Plekhanov, Georgiy Valentinovich (1857-1918), Russian Marxist, 'the father of Russian Social Democracy.' In his early youth he belonged to the Populist (see **POPULISM**) revolutionary organisation 'Land and Freedom'; after its break-up P. headed its non-terroristic successor, 'Black Redistribution.' In 1880 he emigrated to W. Europe, where he became converted to Marxism and in 1883 formed the Liberation of Labour Group (q.v.), which played a most important part in propagating Marxism in Russia and in fighting the rival Populist ideology. When the Russian Social Democratic Labour party (q.v.) was formed in 1898 P. decisively supported its more orthodox Marxist and politically minded wing (see **ECONOMISM**; **ISKRA**), collaborating with Lenin. At the 2nd Party Congress in 1903 and immediately afterwards he sided with the Bolsheviks, but soon went over to the Mensheviks (q.v.). In 1910 he broke with the Menshevik majority over the issue of 'liquidationism' and formed a sub-faction of 'party-minded Mensheviks,' again for some time co-operating with Lenin. During the First World War he advocated an Allied victory over Germany as a means of advancing the Socialist cause. After the Feb. revolution (q.v.) in 1917 P. returned to Russia, where he formed a sharply anti-Bolshevik Right-wing Social Democratic organisation 'Unity.' He d. soon after the Bolshevik seizure of power. P. for many years represented Russian Social Democracy in the Socialist International, and was one of its leaders. He was a doctrinaire Marxist and bitterly fought any revisionist tendencies.

Plenipotentiary, or **Envoy Extraordinary**, person accredited to some foreign sovereign who is invested with unlimited power to negotiate a treaty or transact any other diplomatic business. It is usual for the sovereign powers who are parties to a treaty to ratify the treaty, even though signed by a P.

Pleonasm (*lik pleon*, more), or **redundancy**, means the using of superfluous words that are not in the same grammatical relation, and thus is distinct from tautology (q.v.). It may be used for rhetorical effect, as in 'He that hath ears

to hear, let him hear,' or for special emphasis, as in 'I saw it with my own eyes.' Its effectiveness is doubtful in Johnson's lines:

'Let Observation with extensive view
Survey mankind from China to Peru.'

In such an expression as 'Divide the apple into two equal halves' it is obviously a fault. See also FIGURE OF SPEECH.

Plesiosaurs, group of Jurassic and Cretaceous reptiles highly adapted for aquatic life. They had broad, flat bodies, long, flexible necks, and 4 large, well-developed, paddle-shaped limbs with extra finger-joints. The head was short and bore numerous pointed teeth. There are two groups, one with short heads and elongate necks (e.g. *Plesiosaurus* and *Elasmosaurus*), and the other with short necks and longer heads (e.g. *Plotosaurus*).

Plethon, see GEORGE GEMISTUS PLETHON.

Pleuracanth, fresh-water, shark-like fishes with a diphycceral tail and a long fin down the back. They existed from Devonian to Triassic times, and were abundant in the Carboniferous and Permian.

Pleurisy, inflammation of the *pleura*, the serous membrane enveloping the lung. Each of the *pleurae* has a visceral and a parietal layer, between which is a closed space known as the pleural cavity. In health the two layers are usually in fairly close contact, sliding over each other during the movements of respiration. When the *pleura* is inflamed through invasion by micro-organisms, an exudation takes place which is accompanied by a varying amount of disturbance of the respiratory function and general feverish conditions. The exudation may be fibrinous, consisting of coagulated fibrin, epithelial cells, and blood corpuscles. In this case the surfaces of the membranes are roughened, and pass over each other with a certain amount of friction which can be detected by the ear. This is the common form known as 'dry P.', and may result in the adhesion of parts of the two surfaces or may proceed to serous effusion. The effusion of fluid into the cavity may continue until as much as a gallon is included between the layers. The pleural sac is therefore distended, pressing on and collapsing the lung, breathing and other functions are interfered with, and there is a characteristic painful dry cough. The fluid may gradually be absorbed, when the pleural layers may become united by adhesion or recover their normal condition, or the inflammation may become chronic and recurrent. In some cases the unabsorbed fluid becomes purulent, occasioning the condition known as *empyema* (q.v.). The symptoms of P. may include rigors, fever, and pain in the side in the early stage; in diaphragmatic P. the pain may be referred to the shoulder or to the abdomen. Later on the existence of fibrinous exudation can be detected by the grating sounds, or the pre-

sence of an amount of fluid shown by a dull sound on percussion.

Pleurisy Root, see BUTTERFLY WEED.

Pleuronectidae, see FLAT-FISH.

Pleven, or **Plevna**: 1. Prov. of NW. Bulgaria. Its N. half lies in the Danube (q.v.) basin, but in the S. it has ranges of the Balkan Mts (q.v.). Area 5960 sq. m.

2. Tn of Bulgaria, cap. of the prov. of P., 80 m. NE. of Sofia (q.v.). After a notable defence of the tn, the Turkish leader, Osman Pasha, was forced to surrender to the Russians and Rumanians here in 1877 during the Russo-Turkish wars. Pop. 39,000.

Plevna, see PLEVNA.

Pleyel, Ignaz Joseph (Ignace) (1757-1831), Austrian composer and piano maker, b. Rupperthal, favourite pupil of Haydn. He was musical director of Strasburg cathedral (1783), conducted concerts in London (1792), and settled in Paris (c. 1795), founding a pianoforte manufactory there (1807), now the firm of P., Wolff et Cie. As a composer, mainly of instrumental music, P. had some influence on the development of the symphony and the string quartet and quintet.

Plimsoll, Samuel (1824-98), politician, b. Bristol. He entered Parliament in 1868, and became known for his interest in the sailors of the mercantile marine. One of his objects was to protect the lives of sailors by enforcing a compulsory load-line. To attaining this end he devoted all his energies, and finally secured the passing of the Merchant Shipping Act in 1876. The compulsory load-line (q.v.) is now generally known as P. line.

Plinlimmon, see PLYNLYMON.

Plinth (Gk *plinthos*, tile, brick), in architecture, the lower square member of the base of a column or pedestal; or a block of stone used as a base or pedestal for a statue, bust, or vase; or the square base of a piece of furniture. The term is also applied to the projecting part of a wall immediately above the ground.

Pliny the Elder (Gaius Plinius Secundus) (AD 23-79), Rom. writer on many subjects, b. probably at Novum Comum (Como). He served in Africa, commanded a cavalry troop in Germany (46), and returned to Rome (52). His scientific studies, pursued throughout his life, and especially between 55 and 68, won him fame as the most learned man of his age. P. was procurator in Spain (c. 68-72), held high office under Vespasian, and was commander of the fleet at Misenum under Titus. His zeal for research led to his death by suffocation in the eruption of Vesuvius (79). Of all his writings (hist. of the Germanic wars, of his own time, works on tactics, rhetoric, grammar, etc.) only the *Historia naturalis* remains, a not always accurate encyclopaedic work on science, art, natural hist., and allied subjects, with digressions on human inventions and institutions. The style varies, but is vigorous if sometimes obscure through brevity. See the ed. (with commentary) by J. Sillig (8 vols., 1851-8); also the annotated trans. by J. Bostock and H. T. Riley

(Bohn Library, 1855-7). See also J. O. Thomson, *History of Ancient Geography*, 1948.

Pliny the Younger (Gaius Plinius Caecilius Secundus) (AD 61 or 62-c. 113), Rom. orator and author, nephew and adopted son of P. the Elder, b. Novum Comum (Como). He became an advocate (80), senator (c. 81), military tribune in Syria (c. 82), and after holding other high offices was finally consul under Trajan (100), and governor of Bithynia (111). P. was an intimate friend of Trajan and Tacitus, and studied rhetoric under Quintilian. His remaining works include the 9 books of *Letters*, with a tenth containing his correspondence with Trajan, including the famous letter about the treatment of the Christians in his prov., and *Panegyric on Trajan*. See the ed. of O. R. Kukula (1912) and M. Schuster (1933). The best complete Eng. trans. is that of J. D. Lewis (1879).

Pliocene, or Pleiocene, name given to the topmost div. of the Tertiary system in geology. Strata of this age cover a large area in Norfolk and Suffolk, and occur also in a number of small areas, chiefly about Walton-on-the-Naze, in Essex, where they rest unconformably on the London Clay and Chalk. The beds are termed 'crags' from their 'shelly' nature, being typically marine shell-banks, deposited in shallow water near the shore, and indicating that this area underwent subsidence during P. time. The older P. had probably a warm temperate climate, and is represented by the Coralline Crag; the newer P. was probably cold temperate, and is represented by the Red, Norwich, Chillesford, and Weybourne Crags, the Forest Bed group, and *Leda myalis* beds. Arctic conditions prevailed at the close of P. time. The Coralline Crag, so called from the large number of contained Polyzoa (Corallines), consists of calcareous sands, occurs near Orford in Suffolk, and is 60-80 ft thick. At its base occurs a conglomerate deposit with 'box-stones' and phosphate beds, containing early P. fossils. The fossils of the Coralline Crag are chiefly Polyzoa (*Alveolaria*, etc.), Lamellibranchs (*Astarte* and *Pecten*), Brachiopods, Gasteropods, and over a hundred species of Foraminifera. The Red Crag consists of red ferruginous sands, and covers an area of 300-400 sq. m., but is usually concealed by the Glacial gravels and sands. The fossils are chiefly Mollusca (*Fusus*, *Astarte*, *Pectunculus*), 273 species being known, of which 33 are extinct. The Norwich or Mammalian Crag has a wider distribution than any other P. formation. It ranges from the coast of Norfolk to Orwell in Suffolk (70 m.), and varies in thickness from 30 to 130 ft. Fossils such as *Nucula* and *Telina* occur in these shelly sands of the Crag, and mammalian remains are common and include *Mastodon*, *Elephas antiquus*, *Felis*, *Ursus*, *Bos*, etc. Resting on the Red and Norwich Crags is the Chillesford Crag, which shows many shells of Arctic species (*Cardium*). The Chillesford Clay then follows, and this is suc-

ceeded by the Weybourne Crag with a still larger proportion of N. forms (*Astarte*, *Borealis*, etc.). The Forest Bed group which succeeds consists of fresh-water and estuarine strata, and contains the 'Cromer Forest Bed', which is about 20 ft thick. This bed is formed of clays, lignite, etc., rich in plant remains and stumps of trees (maple, sloe, oak, beech, etc.), and bones of mammalia (hippopotamus, elephant, and beaver). The terminal member of the Brit. P. is the *Leda myalis* bed, formed of 20 ft of marine sands and gravels, with *Leda myalis*, *Mya truncata*, etc. The P. of Belgium (*Diestian*) is arenaceous, and corresponds to Lenham Beds (so called from solution 'pipes' exposed in chalk quarries on the escarpment of the N. Downs, particularly at Lenham, Kent) of the older P. In Britain, chipped flints (ooliths) have been recovered from Late Pliocene deposits. The Suffolk Bore Beds and other crag deposits in E. Anglia are well known for the scrapers and beak-shaped tools which they yield, and certain levels can be recognised as old land surfaces. Most archaeologists now accept that man in Late Pliocene times lived on these surfaces and on the edge of the Crag sea, subsisting on shell-fish and other simple foods. In Italy the P. becomes a marine formation, covering a large area of the sub-Apennines and the is. of Sicily, and consists of clays, marls, and thick limestones. The Alps received their final elevation, and a host of volcanoes broke out along the S. borders of the Alpine regions (Etna, Somma, Santorin, etc.). In India P. strata of fluvial origin (Siwalik Beds) are found in the Himalayas, and are characterised by mammalian remains. The P. of N. America (Colorado, Kansas) is remarkable for the oriental character of the fauna.

Ploek (Russian Plotsk), tn of Poland, in Warsaw prov., 60 m. WNW. of Warsaw (q.v.), on the Vistula (q.v.). It dates from early times, and has a 12th-cent. cathedral, containing tombs of the Polish kings. There is an airport, and there are manufs. of agric. machinery and a trade in cereals. Pop. 28,500.

Ploegsteert, vil. in the prov. of W. Flanders, Belgium, 8 m. S. of Ypres, known as 'Plug Street' to Brit. troops; the vil. and its nearby wood were an important position in the battles of the Ypres salient in the First World War. Over 11,000 missing are commemorated by a memorial.

Ploesti, Ploieshti, or Ploesci, cap. of Ploesti prov., Rumania, 35 m. N. of Bucharest. There are petroleum wells and refineries in the vicinity, it has a pipeline to Constanta, it has trade in wool, and is a road and rail junction. The Rumanian oilfields at P. were of vital importance to Germany during the Second World War, and were therefore heavily bombed by the Allies: 177 Amor. Liberator planes made a low-level daylight attack on 12 Aug. 1943, the raid involving a flight of 2460 m. Pop. (1948) 96,000.

Plombières (-les-Bains), Fr. spa in the dept of Vosges, in a narrow valley

surrounded by fine forests. The sulphurous and arsenical springs were known to the Romans, and were used in medieval times. By the 'Paote de P.', signed in 1858, Cavour here entered into alliance with Napoleon III (see under CAVOUR, C. B., COUNT). Pop. 1700.

Plosives, see PHONETICS.

Plotinus (205-270), Gk philosopher, founder of Neoplatonism, b. Lycopolis in Egypt. At the age of 28 he began to attend the lectures of Ammonius Saccas, the chief forerunner of the Neoplatonists. In 242 he went with the Emperor Gordian to Mesopotamia and the E., and 2 years later established a school at Rome. Here he taught philosophy for 10 years, enjoying the admiration and favour of the Emperor Gallienus. About 262 he retired to Campania, where he died. His works were ed. by his disciple Porphyry in 6 groups, each containing 9 books, and hence known as the *Enneads*. A Lat. trans. was pub. in 1492. P. is an idealist pure and simple. God is spirit, and all that can be attributed to him is goodness and unity. From him emanates intellect (*Nous*), from which comes the world-soul, from which again emanate various forces (including the human soul), whence finally comes Matter. Man's work is to return to union with God by eliminating from his life the unreal and material, and the final step in this union is that of ecstasy. See NEOPLATONISM. The best ed. of Plotinus' works is that by P. Henry and H. R. Schwyzer (1951). There is an Eng. trans. by S. Mackenna and B. S. Page (5 vols., 1926-30). See also W. R. Inge, *The Philosophy of Plotinus*, 3rd. ed., 1929; A. H. Armstrong, *Architecture of the Intelligible Universe in the Philosophy of Plotinus*, 1940.

Plotak, see PLOCK.

Plougastel-Daoulas, tn of the dept of Finistère, France, on a peninsula of the Breton coast. The tn was damaged in the Second World War, the church being almost entirely destroyed, and the fine 17th-cent. Calvary heavily pitted. Pop. 6900.

Plough (Plow) Monday, or Rook Monday, first Monday after Epiphany (Twelfth Day), termination of the Christmas holidays, and herald of the ploughing season. The ancient custom of celebrating it by a procession and drawing a plough from door to door in the par. and begging 'plough-money' for rustic festivities still survives in parts of England.

Ploughs and Ploughing. From a remote period the plough has been the most important implement of husbandry, but only since the middle of the 17th cent. has any advance been made on some of the oldest types, which are still to be seen in use by primitive people. Modern ploughs are of various types, differing in essential features according to the varying conditions of soil and climate. The single-furrow ploughs include 1-wheel and 2-wheel types. Disk ploughs, which have the share and breast of the ordinary form displaced by a large, steel, concave cutting disk, are sometimes used in America for

work in very hard or heavy soil where a breast plough would be impracticable. Turn-wrest ploughs are used horizontally on hillsides, turning the furrow all in one direction downwards. Double and multiple ploughs can be used on light land to economise on manual and horse labour, if other motive power is not available. Among special-purpose ploughs are the double-breasted or ridging plough and the subsoil plough, which travels in the furrows behind an ordinary plough, breaking up a panned subsoil. Other special types are constructed for drainage work, such as the mole plough. The essential parts of a modern type of common plough are the beam, to which the handles are attached; the frame or body, which is bolted to the beam and which carries the breast or mould board; the cutting share; and the hake or head and chain, to which the horses are attached. The large or furrow wheel is placed on the right of the cross-bar, running in the furrow and regulating the width of the furrow slice. The small or land wheel is on the left of the cross-bar, running on the unploughed land; its height regulates the depth of ploughing. The coulter, attached to the beam, makes the vertical cut of the furrow slice, and the skim coulter, attached in front, pares off the top of the furrow on the left side. The breasts of ordinary ploughs are fixed on the right-hand side, and turn the furrow slice on that side only. The work is therefore done in ridges or lands of equal width, varying from 8 to 66 ft. The 3 forms of furrows are the rectangular, the crested or high cut, and the wide, broken furrow. The object of ploughing is to invert the top surface of the soil so as to pulverise it and turn under the surface plant growth and rubbish to be decomposed. The depth of ploughing depends on the condition of the soil and subsoil, and whether the crop that is next to occupy the land is deep or shallow rooting. When the plough passes at the same depth year after year a hardened layer or pan is formed, through which the roots of cultivated plants cannot penetrate. Ploughing is done as early as possible in autumn, so that, especially on the heavier soils, the weather may exercise its beneficial effects as long as possible. Ploughing is impossible during hard frost, and is undesirable in continuous wet weather. Ploughing by steam power has now been ousted by the far more economical tractors driven by internal-combustion engines. Tractor ploughs with multiple breasts embody the principles of the horse plough and are of 2 main types: the trailer plough, with the breasts mounted on, and regulated from, the beam, and the 'Unit' type plough, mounted directly on the tractor, and being raised by the tractor's hydraulic lifting gear. For deep or difficult work specially strong and heavy tractor ploughs are used. They are frequently drawn by track-laying machines. On small areas, hand-guided petrol tractors with one or more ploughs attached are in general use.

Plodiv: 1. Prov. of Bulgaria in the fertile S. plain. It produces cereals, fruit, wine, and rice. Area 6166 sq. m. 2. (Gk Philippopolis), second city of Bulgaria, cap. of the prov. of P., on the Maritza, 55 m. SE. of Sofia. It was founded by Philip of Macedon (see PHILIPPOS), and under the Rom. Empire was cap. of Thracia (q.v.). In more recent times it was cap. of Eastern Rumelia (q.v.). In 1818 it was devastated by an earthquake. P. is the seat of 3 bishoprics, Rom. Catholic, Gk, and Bulgarian. It has textile, leather, engineering, and tobacco industries, and is situated in a fertile fruit- and wine-producing dist. Pop. 127,000.

Plover, name for various limicoline birds of the sub-family Charadriidae, characterised by a short bill, weak at the base and strong at the tip, the nostrils in deep longitudinal grooves. A typical species is the golden P. (*Pluvialis apricaria*), which is plentiful on moors and sea-coasts of most parts of Britain in winter. It is about 11 in. long, and in winter the upper parts are a sooty black with large yellow spots, and white throat and under parts, changing to black in the spring. It nests on the ground, laying 4 yellowish eggs blotched with brown. It is these, as well as the eggs of the lapwing, or green P., which are highly valued as a table delicacy. The Kentish P. (*Charadrius alexandrinus*) is a summer migrant, breeding in considerable numbers in the Romney Marshes. The ringed P. or ring dotterel (*Charadrius hiaticula*) is a small bird with a black band on the throat. Colonisation in the London area was first noticed in 1944, and 3 years later the first pair were seen in Yorkshire. The Norfolk P. or stone curlew (*Burhinus oedicnemus*) is also a summer visitant, frequenting sandy downs. See E. A. R. Ennion, *The Lapwing*, 1949.

Plücker, Julius (1801-68), Ger. mathematician and physicist, b. Elberfeld. Educ. at Düsseldorf, and at the univ. of Bonn, Heidelberg, and Berlin, he went to Paris in 1823, and conferred with Fr. geometers. At Bonn he became *privatdozent*, 1825, and prof-extraordinary, 1829. His first great work was *Analytisch-Geometrische Entwicklungen*, 1828-31. In it he introduced a concise notation, now universally used by mathematicians. The first vol. applied this notation generally, but entered specially into the subject of curves, and the determination of the whole course of any curve from a limited number of points taken in it: the second vol. estab. the principle of duality or reciprocity. P. became prof. of mathematics at Halle, 1834, and ordinary prof. of mathematics at Bonn, 1836. Then came the following works: *System der Analytischen Geometrie*, 1835; *Theorie der Algebraischen Kurven*, 1839; and *System der Geometrie des Raumes*, 1846. In 1847 he became actual prof. of physics at Bonn, and he soon appeared as an original worker in his new subject. His writings on physics were contributed to *Poggendorfs Annalen*. First he dealt

with the magnetic properties of crystals, and the properties of magnetic and diamagnetic bodies: then, earlier than Bunsen, he announced that lines in the spectrum were characteristic of the chemical substance emitting them. Toward the end of his life he returned to his earlier field of study, and developed what is now called Line geometry, adapted to 3-dimensional purposes in which the unit is, instead of the point, the straight line.

Plum (*Prunus domestica*), family Rosaceae; one of the most important hardy fruit-bearing trees. In planting regard should be had to varieties, which are very numerous. A strong retentive loam in which lime is present is the most suitable soil for P. culture, and the situation should be one freely exposed to light and air. For orchard culture, the standard form of tree is the most suitable, but the bush and pyramid forms are valuable for gardens. The fan-trained tree is the best for wall culture. P.s are very successfully grown in pots in light, airy glass-houses. See H. V. Taylor, *Plums of England*, 1949.

Plumage, see BIRD; FEATHERS.

Plumbago, see BLACK-LEAD.

Plumbago, genus of herbaceous plants and shrubs. *P. capensis*, a native of S. Africa, is a valuable greenhouse climbing shrub, with spikes of pale-blue flowers; *P. rosea*, an E. Indian greenhouse perennial, with rosy red flowers. Sev. species have medicinal value.

Plumbing (Lat. *plumbum*, lead), the craft of working in lead, especially in building, including pipe-work, roof covering, etc. The plumber to-day works mainly with alternative and less expensive materials, but is still concerned principally with leading water into the building, and fixing the appliances at which it is used, and with conducting wastes out of the building.

Plumbism, see LEAD POISONING.

Plumer, Herbert Charles Onslow, first Viscount (1857-1932), soldier, great-grandson of Sir Thomas P., one-time master of the rolls. Educ. at Eton and Sandhurst, he began service in the York and Lancaster Regiment, 1876. He served in the Sudan in 1881, being mentioned in dispatches; in S. Africa, 1896, where he raised and commanded a mounted Rifle Corps. He distinguished himself in the S. African war in the operations in Rhodesia, his most notable achievement being the relief of Mafeking. Major-gen., 1902, he was quartermaster-gen. to the forces and a member of the Army Council, 1904-5, and appointed gen. officer commanding N. Command in 1911. In the First World War he held successively the following commands: Fifth Army Corps (1915), Second Army Brit. Expeditionary Force (1915-17); I. Expeditionary Force (Nov. 1917-Mar. 1918); and from 1918 the Second Army of the Brit. Expeditionary Force in France and Flanders. His outstanding achievement on the W. front was the victory of Messines Ridge in June 1917. It is worthy of record that he never

favoured the offensive against Passchendaele Ridge. He was sent to Italy immediately after the It. disaster of Caporetto (q.v.). In the final advance on the W. front his army cleared the Germans from the high ground E. of Ypres and from Ploegsteert (q.v.) Wood and Messines, forced the evacuation of Lille and by the armistice had reached the Scheldt and Ghent. After the armistice he commanded the Brit. Rhine Army. On his return to Britain he received the thanks of Parliament, a grant of £30,000, and a barony. In 1919 he was made governor of Malta, and in 1925 high commissioner of Palestine and Transjordan. See life by Sir C. Harington (his chief of staff in France and Italy), 1935.

Plumeria, a genus of tropical Amer. trees, family Apocynaceae, of which *P. rubra*, Frangipani or Indian Jasmine, is widely grown in warm countries for its highly scented blooms.

Plumpton, vil. of Sussex, England, 4½ m. NW. of Lewes. Race meetings are held annually from Sept. to May. The par. church dates from the 10th cent. Pop. 820.

Plumstead, par. in the NE. of the bor. of Woolwich, London, and until the mid-19th cent. still a distinct village. On P. marshes to the N. are a rifle range and powder magazines.

Plural Voting, electoral system that allows a person more than 1 vote at the same election. For parl. elections in the U.K. before 1918 there was a certain amount of P. V., inasmuch as a man could qualify as a landowner, although not as a resident, in sev. constituencies. By the Representation of the People Act, 1918, P. V. was almost abolished, and the position then was that a person could not have more than 2 votes and these had to be given in 2 constituencies. He could be registered both in respect of a residential qualification and also as a voter in a univ. constituency, or again in respect of a residential qualification and in respect of business premises. The Representation of the People Act, 1948, abolished P. V. by abandoning the univ. constituencies and removing the business-premises vote.

Pluralism (metaphysics), theory that all existence is ultimately reducible to a multiplicity of distinct and independent beings or elements. As such, P. is directly opposed to monism (q.v.) and is distinguished from dualism in that it postulates many realities and allows greater qualitative diversity. To-day it is usual to notice only materialistic and spiritual P. There is an increasing departure from the postulations of materialistic P. since it offers no explanation of the origin of mind, declaring that mind itself is not real. Bertrand Russell formulates a variation on the theme by propounding that the world, so far as we know it, is composed of a number of elements, and one method of arrangement produces mind, while another 'pattern' produces matter. P. describes rather than explains mind, and critics hold that limit to be its chief weakness. Spiritual

P. is the form most widely considered to-day. It is based upon the conception of Leibnitz (q.v.) that reality is made up of an infinite number of individual forces, whose nature is psychic. These he terms 'monads,' and he claims that God has evolved them to fulfil His ultimate will. He shows a movement of complete upward development from one level to the next. This theory is supported by Howison in America, though it has not yet been satisfactorily explained how there can be interaction between individual minds having a concrete existence. P. forms the basis of many theistic theories which begin by assuming the origin and ultimate development of individual minds. It is this assumption which provides critics with most of their material. See also MONAD and MONADISM. See Leibnitz, *Monadology*, 1714; W. James, *A Pluralistic Universe*, 1910; C. A. Richardson, *Spiritual Pluralism and Recent Philosophy*, 1919; and W. Carr, *A Theory of Monads*, 1922.

Pluralism (political science), theory which regards the State as an institution, essentially similar to churches, trade unions, etc. Thus follows a denial that the State has any theoretical claim to sovereignty over such other institutions. H. J. Laski (q.v.) was the prin. exponent.

Pluralism (eccles.), the holding of more than one living or benefice at the same time. This was forbidden in England at the time of the Reformation by an Act of 1529, except with respect to benefices above the yearly value of £8. In the 18th cent., however, P. was rife. Pluralities are now regulated by the Act of 1837, which repealed the Act of 1529 and declared pluralities illegal except where the livings were of small value and situated in dists. of a small pop., and the Act of 1885 whereby 2 benefices may, by dispensation from the Archbishop of Canterbury, be held together if the churches are within 4 m. of each other and the value of one of them does not exceed £200.

Plurality (in logic), contention that a certain effect is not produced by one and the same cause, but that different causes can result in similar effects. The theory was laid down by J. S. Mill (q.v.), and is referred to as P. of causes. While the statement may be superficially true, under close examination it is doubtful, for many effects which appear to be similar are fundamentally different in kind or degree. For example, many causes will produce unconsciousness in the human mind, and apparently this instance bears out P. as a feasible contention, but there are many kinds of unconsciousness, each very different from the others. Meticulous inquiry therefore rejects much of the evidence which is brought forward to support the theory. See J. S. Mill, *Logic*, 1875.

Plush (contraction from *peluche*, hairy fabric), kind of cloth of silk, nylon or other man-made fibres, cotton, or wool, or a mixture of these, woven like velvet, but having a longer and softer nap. It is used chiefly for rich garments, cloaks, and upholstery.

Plutarch (c. AD 46–after 120), Gk miscellaneous writer, philosopher and moralist, and biographer, b. Chaironeia, Boeotia. He lectured on philosophy at Rome during Domitian's reign, winning the friendship of persons of distinction, and holding high office under Trajan and Hadrian. He d. in his native tn, where he probably wrote most of his famous *Parallel Lives* (46 parallel lives of Greeks and Romans, arranged in pairs for comparison) and 4 single lives. The interest of these biographies is mainly ethical and not historical, but they remain among the great books of the world, and their influence has been vast. P.'s style is honest, but sometimes cumbrous and obscure. Among the couples compared



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are Theseus and Romulus, Pericles and Fabius Maximus, Alcibiades and Coriolanus, Alexander and Caesar, Demosthenes and Cicero. His philosophical and ethical works are usually grouped together as *Opera Moralia*. They treat of a variety of subjects, and are valuable for numerous quotations from lost Gk poems and dramas.

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Pluto, see HADES.

Pluto, planet. The discovery of Neptune (q.v.) in 1846 from its perturbations on Uranus suggested that a similar method could be used for detecting a trans-Neptunian planet, if such existed. Percival Lowell, working on lines similar to those adopted by Leverrier and Adams, indicated where the planet would be found, but did not live to see his prediction fulfilled. On 21 Jan. 1930 C. M. Tombaugh at the Lowell Observatory, Flagstaff, Arizona, was rewarded for his efforts, as a photographic plate showed the image of the new planet which he had sought for years. The result of examining the plate was announced on 13 Mar. of the same year. Although it was in the direction predicted by Lowell, it was much nearer than he had suggested, and it was probably by good fortune that search in the right place was carried out. The new planet named P. was found to be moving in a very eccentric orbit, eccentricity 0.249, at an inclination of nearly $17^{\circ} 8'$ to the ecliptic. It takes about 248 years to complete a revolution round the sun, and its mean distance is 3,666,000,000 m., but its high eccentricity makes it approach the sun to within 2,675,000,000 m. at one time and to recede to 4,657,000,000 m. at another, so that it comes within the orbit of Neptune during its revolution. Its period of axial rotation, diameter, and mass are unknown, but it is probably comparable with Mars in size and mass. If it has any satellites they are too small to be detected, even with the most powerful of modern telescopes. It is thought that there may be one or more planets beyond P., but this is mere conjecture.

PLUTO (pipeline under the ocean), see PIPELINE.

Plutonic, see IGNEOUS ROCKS.

Plutonium (symbol Pu), metallic element made by bombarding uranium with neutrons. Its atomic weight is 239 and its atomic number 94. It can itself be disintegrated by neutrons, enormous amounts of atomic energy being liberated explosively (as at Nagasaki). At first P. was believed to be a purely artificial element, but later it was stated that it occurs naturally in minute amounts. Its atomic fission can be controlled, which makes it suitable as a source of atomic energy for industrial purposes.

Plutus (*Ploutos*), Gk personification of riches, son of Demeter and Iasion, often represented as lame but winged, and said to have been blinded by Zeus that he might bestow his gifts indiscriminately.

Pluviöse (rainy month), fifth month of the year in Fr. revolutionary calendar. See CALENDAR.

Pluvius, title like 'Imbricator' of Jupiter as the sender of rain.

Plymouth, important naval and commercial seaport of Devon, England, situated between the estuaries of the Tamar and Plym R. on the boundary of Devon and Cornwall, nearly 250 m. by rail WSW. of London. Originally 3 separate tns, Devonport, E. Stonehouse, and P., an amalgamation took place in 1914

under the inclusive name of P. There are 3 harbours, Sutton Pool, Catwater (Cattewater), and the Hamoaze, which unite in P. Sound, a spacious bay which has a breakwater a mile in length across the entrance; nearly 4,000,000 tons of local stone were used in its construction. The chief gov. establs., viz. the naval dockyard, barracks, gun wharves, etc., are at Devonport. At Stonehouse are the naval hospital, Royal Marine barracks, victualling yards, etc. At Mount Batten is the R.A.F. station, an important coastal command and Air-Sea Rescue base in the Second World War. P. is the centre of trade.

Historically P. is one of the most interesting cities in Great Britain. It was from here that Drake, Hawkins, and Grenville sailed on many of their great voyages; the *Mayflower* set forth from P. with the Pilgrim Fathers to America; Capt. Cook led his first voyage of circumnavigation, and his last and fatal voyage of 1776, from this same port. Dominating the city are the mighty ramparts of the 17th-cent. citadel, built soon after the long and stubborn sieges when P. successfully withstood the attacks of the Royalists in the Civil war. In and around the city there remain very many relics of these aspects of her anct past. The sect known as the P. Brethren (q.v.) originated here after 1830. Amongst the city's many attractions to visitors is P. Hoe, on which Drake was playing his historic game of bowls when report was first received of the sighting of the Sp. Armada in 1588. P. has a marine biological station and aquarium.

In the Second World War P. was subjected to many intense aerial bombardments, and the record of death and destruction made it proportionately the worst hit city in Great Britain. Civilian casualties alone were 5620, with 1172 killed; 72,102 houses were damaged, with 3754 completely destroyed. Nearly all the civic buildings, including the public library, with its total stock of 80,000 books, were wiped out. As a result, many of the narrow winding streets of the old tn completely disappeared and the city was faced with a vast problem of reconstruction. In 1943 a 'Plan for Plymouth' was pub. propounding a scheme of redevelopment which envisaged one of the finest city centres in Europe. Since 1945 a number of new industries have been estab., giving employment to many thousands of workers in the manuf. of clothing, radio equipment, lubrication products, and processed foods. Great progress has been made in reconstruction and re-housing, and by the autumn of 1954 10,200 permanent and 2250 temporary houses had been built, as well as 100 shops and departmental stores in the tn centre. The tn returns 2 members to Parliament. Pop. 218,600.

Plymouth, chief tn of Plymouth co., Massachusetts, U.S.A., situated about 35 m. S.E. of Boston. It is the oldest tn in New England, having been founded by the Pilgrim Fathers, who left P. in England

and settled there in Dec. 1620. It stands on a fine harbour, the commerce is considerable, and the chief industries are the manuf. of rope, twine, and worsteds, and fishing. There are sev. handsome churches and a fine hall, where there are pilgrim relics and historical paintings. Pop. 10,540.

Plymouth (Devon) (1768-70), first hard-paste porcelain in England, founded by William Cookworthy. In 1770 transferred to Bristol.

Plymouth Brethren, or Darbyites, religious movement which started in Dublin about 1827 and spread thence to Plymouth, Bristol, London, and other tns. Originally a reaction from formalism and clericalism, it gained numerous converts, many of them of high social position, through the work of John Nelson Darby (1800-82). He was called to the Irish chancery bar in 1822, but did not practise; in 1825 he was admitted to deacon's orders in the Irish church, but resigned his curacy about 1827. He gave his life to evangelistic work in Ireland, England, Switzerland, and other continental countries, and also visited America. P. B. were at one time widely known as *Darbyites*. Divs. in the Plymouth meeting led, after much controversy, to a separation of the 'Open' from the 'Exclusive' Brethren. There have been many other internal disputes, but the movement continues powerful in sev. countries. P. B. stand for a simple world-renouncing piety, regard the Bible as infallible, look for the speedy Second Coming of Christ, reject a professional ordained ministry, and 'break bread' together weekly in memory of the death of Christ. See W. G. Turner, *John Nelson Darby*, 1944.

Plymouth Sound, arm of the Eng. Channel between Devon and Cornwall, covering an area of 4500 ac., affording good anchorage and including the following inlets: the Cattewater, Sutton Pool, Mill Bay, Stonehouse Pool, and the Hamoaze, the latter used as a naval harbour, and Cawsand Bay on the W. A long breakwater was completed 2½ m. S. of the Hoe in 1841, and this shelters the harbours from the SW. gales.

Plympton, mrik tn of Devon, England. 4½ m. N.E. of Plymouth. P. is a 'stanary' tn, comprising the pars. of P. St Mary and P. St Maurice; the latter was a bor. until 1842, and was the H.Q. of Prince Maurice (1643) and the bp. of Sir Joshua Reynolds (1723), who was educ. at the grammar school (founded 1658). St Maurice has also an anct guildhall, and there are ruins of an old castle. Pop. 10,000.

Plymstock, par. and vil. of Devon, England, on the Catwater and Plymouth Sound, 3 m. S.E. of Plymouth. Limestone and marble are found. Pop. 12,000.

Plynlymon (2469 ft), mt of central Wales, commanding an immense view to N. and S., 10½ m. W. of Llanidloes. It is formed chiefly of clay-slate, with veins of lead. The Wye, Severn, Llynfant, Rhedol, and Ystwyth Rs. rise on its slopes.

Plywood, thin layers of wood, with the grain running in opposite directions, glued together under pressure. P. is extensively used in much joinery (q.v.) which was formerly worked in solid wood, e.g. panelling (q.v.). Although the modern form of P. has only been produced in recent years, certain forms of lamination have been used by wood-workers from very early times. In an Egyptian tomb a headpiece to a bedstead was discovered which had been built up on the P. principle and veneered in laburnum wood, inlaid with gold, although it is not known how the laminations and veneers were cut and cemented or glued together. Joinery experts consider that the use of central heating in buildings, and the high temp. demanded on ships, necessitating the production of a material that would stand up to these conditions, led, not to the actual introduction of P. in recent years, certainly to its rapid development, which has had considerable influence upon the design of modern work. Its production on a large scale has revolutionised the joiner's craft. In the past, design and construction had been greatly modified by the nature of the wood, the joiner working in solid wood having always to allow for some amount of shrinkage in his material. The shrinkage in P., however, is almost non-existent; while the large sizes in which it is now produced (Gibson sheets of 65 x 183 in. are not exceptional) and the invention of new joinery machinery have meant the adoption of larger, less detailed designs. P. is widely used for doors, screens, and corridors in shops and offices, and in the fitting out and decoration of ships. The three types of P. in general use are multiply, laminated board, and block board. Multiply is built up of 3, 5, 7, or more layers of thin wood cemented together so that the grain of alternate layers runs at right angles. Laminated board has a core, consisting of narrow strips of wood set at right angles to the encasing plies, over which sheets are then cut across the grain and the core finally faced on both sides with outer laminations. Block is similar in construction to laminated board, the difference being that the inner core of block board is made up of wide laminated strips or blocks. These 3 types are manufactured in 3 grades of different quality. The introduction of synthetic-resin adhesives that set permanently under heat treatment and do not soften in damp conditions has considerably extended the range of usefulness of P. See also **PANELLING**; **VENEERING**.

Pilsen: 1. Region (*kraj*) in W. Czechoslovakia, bordering on Bavaria, part of the former prov. of Bohemia (q.v.). It is watered by the Berounka and other affluents of the Vltava (q.v.), and it contains part of the Forest of Bohemia (q.v.). Area 3043 sq. m. Pop. 545,000. 2. (Ger. Pilsen), Czechoslovak town, cap. of the region of P., on the Berounka. It has a Renaissance inn hall, and a church with the highest tower in Bohemia. It is famous for its beer (Pilsener lager), and

has coal, steel, chemical, and engineering (Škoda works; founded 1869) industries. Pop. 120,800.

Pneumatic Chemists, The, name frequently applied to those 17th- and 18th-cent. chemists who particularly applied themselves to the study of gases. Prominent among them were J. B. van Helmont, Joseph Black, Joseph Priestley, and the Hon. Henry Cavendish. The first of these invented the word *gas* (from *gela* and *chaos*).

Pneumatic Despatch, see **TUBES**, **PNEUMATIC**.

Pneumatic Power Transmission. Compressed air is used in mines, where other forms of power are dangerous, for operating pneumatic tools, sump pumps, and hoists. Most engineering works also use compressed air in the foundries for operating moulding machines, for drying cores and cleaning completed castings by sand blast.

For normal installations where the air main is not long the pressure is approximately 100 lb. per sq. in., but in long mains higher pressures may be used, with a reducing valve near the scene of operation. The compressed-air plant consists of a compressor with its prime mover, complete with drives and accessories, which may include after-cooler, moisture separator, receiver, and installation air piping. It is important that the piping installation should be of ample diameter to ensure a sufficient velocity of air and to prevent undue loss of pressure in friction. Usually a velocity of 30-40 ft. per sec. through the pipes is satisfactory, but care should be taken that there are no sharp corners. To obtain dry air at the point of application it is important to arrange that all branches from the main supply pipe connect to the top of the piping, and there should also be a slope in the piping, preferably away from the receiver, so that any moisture or oil will flow in the direction of the air stream. Such oil and moisture is drained away wherever necessary by arranging a downward branch to each length of main and fitting a drain valve at the bottom. The pipe need only be of a strength requisite to the pressure; the jointing of the pipes is important in order to prevent leakages. In cases where the compressed air is required at some distance from a power supply portable compressors are used. These are self-contained units mounted for easy transportation, and the compressors can be driven by petrol or diesel engine, or by electric motor. See **COMPRESSED-AIR MOTORS**; **PNEUMATIC TOOLS**.

Pneumatic Tools, appliances using compressed air as motive power.

Rock Drills, machines using compressed air for the perforation of rock by combined percussive and rotary action. A blow is delivered to the drill steel either directly or through an anvil block by a piston in a cylinder, the movement of the piston being controlled by an automatic valve designed to make the piston strike heavy blows at a rate of 800 - nearly 3000 per min. *Pneumatic Tools*

(*Percussive*) are used for concrete breaking, clay digging, chipping, caulking, riveting, etc. The action is similar to the rock drill, but the shank does not rotate. *Pneumatic Tools (Rotary)* are used for drilling, grinding, tapping, reamering, etc., and transmit rotary action to a twist drill or other attachment. *Pneumatic Appliances, machines, etc.*, which use compressed air for purposes other than those specified above, such as air motors, hoists, coal cutters, etc. Also included are impact wrenches, spray guns, cement guns, air brakes, air chucks, air-lift pumps, sump pumps, and sand blasters.

The advantage of all P. T. lies in their efficiency in operation, in the fact that the tools and compressed-air plant can be transported with ease, and in that they are almost foolproof so that little training is required for their use. See PNEUMATIC POWER TRANSMISSION; COMPRESSED-AIR MOTORS.

Pneumatic Trough, vessel used for collecting gases over a liquid (generally water). The trough is filled with water, and jars to contain the gas are filled with water and inverted on a 'beehive' shelf. The gas passes up through the perforated shelf and fills the jars by displacement. For the collection of gases soluble in water, the latter may be replaced by mercury.

Pneumatic Tyres, see TYRES.

Pneumatics, term now almost obsolete. The study of the properties of gaseous fluids is now included in the term *Hydrodynamics*.

Pneumatolysis, geological term for the processes of reaction between active gases circulating within the crust of the earth and the rocks through which they pass; many ore deposits owe their origin to pneumatolytic action.

Pneumogastric Nerve, *vagus* (i.e. 'rambling,' referring to its wide distribution), or tenth cranial nerve. It originates in the floor of the fourth ventricle and supplies the ear, pharynx, larynx, heart, lungs, oesophagus, and stomach by its branches, the auricular, pharyngeal, superior and inferior laryngeal, cardiac, pulmonary, oesophageal, and gastric nerves.

Pneumonia, inflammation of the lung. An acute infectious disease caused by a specific micro-organism and running a course classically divisible into the following stages: (1) *Congestion*: the lung substance is gorged with blood and is heavier than normal, though it still contains air. (2) *Red hepatization*: an exudation of fibrinous material mixed with epithelial cells and blood corpuscles takes place; the colour of the lung is dark red, and the substance resembles liver tissue. (3) *Grey hepatization*: a degenerative change takes place in the exudate, and the colour turns to grey, while the lung maintains its liver-like consistency. In favourable cases the exudate may be absorbed or expectorated, and the lung becomes rapidly free from fibrinous material. Where resolution does not take place, death may occur from poisoning of the

blood or extension of the inflammatory process. The symptoms at the early stage are shivering, cough, and fever, the temp. rising to 104° or 105°. There is a characteristic dusky flush, laboured breathing, and pain in the side, particularly if pleurisy be present. The expectoration is at first viscid and colourless, but afterwards takes on a reddish hue, due to the presence of epithelium, blood corpuscles, etc. A dull sound is produced by percussion of the affected part, and fine crepitation may be heard during the stages of congestion and red hepatization, while a coarser crepitation is audible when grey hepatization sets in. In a majority of cases there is a crisis between the sixth and eighth days; if the outcome is favourable the temp. rapidly falls, and the patient proceeds to recovery in a remarkably short time. The treatment of P. has been revolutionised by chemotherapy—first the sulphur drugs, and then the antibiotics—so that the classical sequence of events described above is now seldom seen. P., however, is still a dangerous disease, as infecting organisms change their nature to meet the challenge of chemotherapy. For P. in horses see HORSE (DISEASES).

Phnom Penh, see PHNOM PENH.

Pnyx (Gk *Πνυξ*, from *Πνυξ*, crowded), name of the public place of assembly in Athens. It was probably semicircular in shape, cut on a slope connected with Mt Lycabettus, W. of the Acropolis and SW. of the Areopagus.

Po (Gk *Εριδανος*; Lat. *Padus*), largest riv. of Italy, irrigating the plains of Piedmont, Lombardy, Veneto, and Emilia-Romagna (q.v.). It rises in the Cottian Alps (q.v.), on the Fr. border, 16 m. W. of Saluzzo (q.v.), and flows past Saluzzo, N.E. to Turin, and Chivasso, and then in a tortuous course E. past Piacenza and Cremona to the Adriatic, which it enters by a delta (35 m. long), S. of the Gulf of Venice (q.v.). Its chief mouths are the P. della Maastra, della Tolle, di Goro, di Gnoca, and di Volano. At Parla the riv. is only 300 ft above the Adriatic's level, having dropped from over 6000 ft. Among its chief tribs. on the l. b. are the Dora Riparia (near Turin), Dora Baltea, Ticino (draining Lake Maggiore), Adda (draining Lake Como), Oglio (draining Lake Iseo), and Mincio (draining Lake Garda). On the r. b. are the Tanaro, Trebbia, Parma, and Secchia. As the current carries much sediment from the mt torrents feeding it, the P.'s delta increases as rapidly as that of the Mississippi. Below Piacenza embankments are kept up to prevent inundations. Canals connect the various tribs. with each other and with the P., the chief being Cavour Canal joining the Ticino (q.v.) and the P. The total length is 420 m., and the drainage area 29,000 sq. m. The P. is navigable beyond Turin. Sturgeon, salmon, and other fish abound, and its valley is a highly productive agric. area, rice being an important crop. It has been many times used as an invasion route, and was the scene of many Austro-It. conflicts.

In the Second World War campaigns on the It. front the Allies under F.-M. Alexander (q.v.) reached the P. on 23 April 1945, having, after a long struggle, captured Bologna (20 April). The Germans, retreating across the P. valley on 22 April, were bombed with devastating results. With the fall of Modena and Ferrara S. of the riv., the Allies were in a position to cross (24 April). Six days later all Ger. armies in Italy surrendered. See ITALIAN FRONT, SECOND WORLD WAR, CAMPAIGNS ON.

Poa, a genus of ann. and perennial grasses, family Gramineae; about 250 species, chiefly of temperate regions; *P. annua* is the ann. Meadow grass; *P. nemoralis*, Wood grass, and others are used for garden lawns.

Poaching, see GAME LAWS.

Pobedonostsev, Konstantin Petrovich (1827-1907), Russian jurist and statesman. In 1868 he became a senator, in 1872 a member of the State Council, and in 1880 Procurator of the Holy Synod of the Russian Orthodox Church. P. was the inspirer of the reactionary policies of Alexander III. See his *Reflections of a Russian Statesman*, 1858.

Pocahontas (c. 1595-1617), Indian princess, noted in the colonial hist. of Virginia, daughter of Powhatan, an Indian chief of Virginia. She is famous through Smith's story in his *True Relation*, 1608, and *General History of Virginia*, 1624. Smith states that he was captured by the Indians and condemned to death, but was saved by the intervention of P., then a little girl. When she grew to womanhood she married John Rolfe (c. 1614), one of the Jamestown settlers, coming with him to England (1616). She d. and was buried at Gravesend, Kent, after giving birth to a son who subsequently returned to Virginia and is claimed as an ancestor by many prominent families in the state. John Randolph of Roanoke claimed descent from her. See Doane's ed. of Smith's *True Relation*, 1866; E. D. Neill, *Pocahontas and her Companions*, 1869; E. Eggleston and L. E. Seelye, *Pocahontas*, 1879; W. Robertson, *Pocahontas and her Descendants*, 1887; C. Poindexter, *Captain J. Smith and his Critics*, 1893; also lives by W. Robertson and D. Garnett, 1933.

Pocatello, tn of Bannock co., Idaho, U.S.A., on Portneuf R. near American Falls Reservoir, and 195 m. ESE. of Boise. It is the second largest city in Idaho, a railroad centre, and a wholesale trade and shipping point for an irrigated agric. area. Idaho State College is here, and there is flour milling, brewing, and the manuf. of clothing. Pop. 26,131.

Pochard, or Red-headed Plover (*Nyroca ferina*), handsome duck which occasionally breeds in Britain, but which is imported in considerable numbers from Holland for the market. The male's head and neck are chestnut-red; the breast, upper part of back, quill feathers, and rump are black; the sides and the under parts are greyish-white and the base and point of the bill are black, and the central portion

pale blue. The female's bill is black and her plumage is greyish-brown except for the greyish-white under parts. P.s feed largely on water plants, for which they dive. The nest is made in long grass on the borders of lakes and pools.

Po-Chü-i, see CHINESE LITERATURE.

Pocket Battleship, see NAVAL OPERATIONS IN SECOND WORLD WAR; NAVY AND NAVIES.

Pocket Borough ('rotten' borough), see ELECTORATE.

Pocklington, mkt tn of the E. Riding, Yorks, England, 13 m. SE. of York. There are corn mills and manufs. of agric. implements. Wilberforce (b. 1759) was educ. at the grammar school (founded 1515), now a large public school. The church is a 13th- to 14th-cent. structure. Pop. 3313.

Pocomania, a Christian revivalist cult found in parts of the W. Indies, especially Jamaica. It is combined with certain W. African traits, such as the trance. Originally it was directed against the powers of Obeah (q.v.), and probably comes from the Myal (q.v.) movement of slavery days. Pocomanias induce trances by autosuggestion, during which they speak with tongues. See T. Banbury, *Jamaica Superstitions*, 1894; F. Henriques, *Family and Colour in Jamaica*, 1953.

Poděbrad und Kunstat, Georg Boczkos von (1420-71), King of Bohemia, b. Poděbrad. On the death of Sigismund (q.v.) he joined the Utraquists (see HUSSITES), supporting Casimir of Poland as ruler, and becoming their leader (1444). By 1452 he was regent for Ladislaus Posthumus, and was elected his successor (1458). He was excommunicated by Pius II (1463) and by Paul II (1466) for failing to lead the country back to the Rom. Catholic Church. War broke out with Matthias Corvinus and the Hungarians, but peace was concluded about 1467. See L. Jordan, *Das Königthum Georgs von Podiebrad*, 1861; A. Bachmann, *Georgs von Podiebrad Wahl* . . ., 1876, and *Böhmen* . . ., 1899-1905.

Poděbrady, Czechoslovak tn in the region of Prague (q.v.), on the Labe (see ELBE). Pop. 10,600.

Podestà, It. municipal officer of the 12th to 16th centuries, the chief military and administrative official of the commune. Mussolini replaced the title of mayor by that of P.

Podgorica, or Podgoritz, see TITOGRAĐ.

Podium (Lat.), in classical architecture, the square member forming the lowest stage of a column-pedestal; or the continuous projecting base or platform under a building.

Podmokly (Ger. Bodenbach), Czechoslovak tn in the region of Usti nad Labem (q.v.), near the Ger. border. It is on the Labe (see ELBE) opposite Děčín (q.v.), to which it is connected by bridge. Electrical machinery and chemicals are manuf. Pop. 6400.

Podolia (Ukrainian Podillya), area in W. Ukraine comprising NE. Galicia (Ternopol' Oblast) and Khmel'nitskiy and Vinnitsa Oblasts. It lies largely between

the rivs, Dniester and S. Bug, on the Volhynia-P. upland. It belonged to the Kievan State (see KIEVAN RUSSIA), then to the Kingdom of Galicia and Volhynia (q.v.), Lithuania, and Poland. E. P. has been Russian since 1793; W. P. became Austrian in 1772, and was again Polish 1918-39.

Podol'sk, tn in Moscow Oblast, 25 m. S. of Moscow. It is a rapidly growing centre of engineering and cement industries. Pop. (1956) 113,000 (1926, 20,000, 1939, 72,000). Before 1764 it was a vill., since 1781 it has been a dist. tn; its industrial development dates from the late 19th cent.

Podophyllum, or May-apple, genus of herbaceous perennials (family Podophyllaceae) with large ornamental shield shaped leaves, and white or reddish purple flowers, followed by red berries. *P. peltatum*, May-apple, or Amer. Mandrake of N. America, is sometimes grown in damp borders; its roots and leaves are poisonous.

Podostemaceae, family of branched and floating herbs, resembling liverworts, chiefly occurring in S. America.

Poe, Edgar Allan (1809-49), Amer. poet, story writer, and critic, b. Boston. His father was of a well-known Baltimore

(1816-21). Then he entered Richmond Academy, Virginia, and went to Virginia Univ. in 1826. His irresponsible behaviour displeased his guardian and he was put into Mr Allan's office. P., unable to endure business life, soon left for Boston to make his first effort at supporting himself by literature. He pub. *Tamerlane and other Poems* under a pseudonym in 1827. Becoming destitute, he enlisted in the U.S. Army under an assumed name, but was bought out next year by Mr Allan and appointed to a cadetship at the U.S. Military Academy. After 6 months he was court-martialled and dismissed for neglect of duty. From this time he made a scanty living by contributing to Amer. journals. By the pub. of such masterpieces as *Tales of the Arabesque and Grotesque*, 1840, and *The Raven*, 1844, he gained a very considerable reputation. He became editor of the *Southern Literary Messenger* of Baltimore, in which he initiated a style and freedom of criticism new to Amer. readers, and later of *Graham's Magazine*. He had married in 1836 his 14-year-old cousin, Virginia Clemm, a false statement as to her age being made at the time of the marriage. Their life was marked by poverty, which caused the bitterness in much of his work. She died in their little cottage at Fordham, near New York city, in 1847. *Annabel Lee*, 1849, was written in memory of her. Save for *Uralume*, 1847, and *The Bells*, 1849, his work was at an end. Visiting Baltimore in 1849 he became ill there and d.

The world has produced few more subtle or successful poetical craftsmen, for his verse, though small in bulk, exhibits extraordinary powers of technique and acquaintance with the subtleties of rhythm and syllabic change. Perhaps even more surprising was his ability to bring into play and weave into his tales and poems such an atmosphere of wonder and terror. He was the first to give a definition of a short story and one of the first to practise the art. In *The Mystery of the Rue Morgue*, 1841, and other tales he was the originator of the modern detective story. He was no less notable as a critic, analytical and knowledgeable in literature. He was not given to light praise, but he was among the first to celebrate Tennyson, Dickens, and Hawthorne.

In Dec. 1949 a tablet was unveiled in Stoke Newington Central Library with the inscription: 'Edgar Allan Poe, b. 809, d. 1849, Amer. romancer, poet, and critic, was a pupil at the Manor House School which stood near this spot, during his boyhood, 1817-1820.' His prin. works, besides those named, are *The Fall of the House of Usher*, 1839, *The Gold Bug*, 1842, *Tales*, 1845, and *Eureka: a Prose Poem*, 1848. His *Complete Works* were ed. in 17 vols. by J. A. Harrison in 1909, and his *Letters* by J. Ostrom, 1949. See H. Ingram, *E. A. Poe: His Life, Letters, and Opinions*, 1880; and studies by J. W. Krutch, 1926, and A. H. Quinn, 1942.



EDGAR ALLAN POE

family and his mother was Eng. Both died while he was a child. He was taken into the family of John Allan, a well-to-do tobacco merchant of Richmond, Virginia. Though he added the name of Allan to his own, he was never legally adopted. He was educ. at Stoke Newington in England

Poema de mio Cid, Sp. epic poem of some 4000 lines, written c. 1140. Its subject is an episode in the life of a Castilian soldier and condottiere, Rodrigo Díaz de Vivar, known as the Cid. It tells in sober and realistic language of the Cid's victories over the Moors, and his capture of the great city and plain of Valencia. Recent scholarship has shown that the story keeps fairly close to historical events. The Cid combines in his person the highest conception of valour and courtesy; and this, combined with his skill as general and guerilla warrior, has caused him to be held up by the Spaniards as a national hero. The best ed. of *The Cid* is in the *Cidricos Castellanos* ed., with preface and notes, by Menéndez Pidal. There are Eng. trans. by J. Ormsby and L. B. Simpson.

Poet Laureate, see LAURATE.

Poetry. 'Epic poetry and tragedy, as also comedy, dithyrambic poetry, and most flute-playing and lyre-playing, are all, viewed as a whole, modes of imitation' (Aristotle). As the means of imitation Aristotle enumerates rhythm, melody, and verse, but in comparing Homer with the philosopher Empedocles he explains that writing in verse does not necessarily make P. This distinction is echoed by Hazlitt: 'All is not poetry that passes for such: nor does verse make the whole difference between poetry and prose. The *Iliad* does not cease to be poetry in a literal translation; and Addison's *Campaign* has been very properly denominated a Gazette in rhyme.' Yet didactic P. (q.v.) from Empedocles to Pope is a recognised genre of P., and for practical purposes verse or rhythm is an essential part of P. Hazlitt recognises this: 'The best general notion which I can give of poetry is, that it is the natural impression of any object or event, by its vividness exciting an involuntary movement of imagination and passion, and producing by sympathy a certain modulation of the voice or sound expressing it.' This is an expansion of Milton's lines:

'Thoughts that voluntary move Harmonious numbers.'

No poetic theory denies harmony, although a repetitive metrical system has been dispensed with by Milton himself. The theory of Free Verse (q.v.) is, however, usually associated with certain 20th-cent. poets. A continuance of one kind of verse is characteristic, as Aristotle points out, of epic P., and in this it differs from dramatic P., although epic and tragic P. agree in being 'an imitation of serious subjects in a grand kind of verse' (see EPIC POETRY). The repetition of the verse form in lyric P. is proper to song (see LYRIC), while the Gk dramatic choruses and Pindar's odes represent a more sustained and ceremonial form of song. The false Pindaric or irregular ode has had an honourable tradition in England from Spenser downwards (see ODE). The sonnet (q.v.) originated in Italy, and other intricate forms of P. (triolet, etc.) in France (see VERSE). Ballad (q.v.) P.

combines lyric and narrative, while storytelling in P. from Chaucer to Massfield represents an epic form of P. in a lighter vein than that known to Aristotle. No account of P. and its various forms is complete without reference to the relations of P. with the age in which it is created. Shelley says truly: 'Poets, not otherwise than philosophers, painters, sculptors, and musicians, are in one sense the creators, and in another the creations, of their age.' W. J. Courthope, in his *History of English Poetry*, 1910, adopts this conception of art, which is liable to be forgotten in the present age. He sums up P. in the definition: 'The art of Poetry is a mirror for the imagination of men living in a society at once historic and free. Its time-honoured forms, epic, dramatic, didactic, and lyric, are so many vehicles for the expression of ideas not merely existing in the mind of the individual poet, but representative of the action and character of those who live in his age and speak his language.'

For the P. of specific nations or national groups see the sections *Literature* under the heading of various countries. See articles mentioned above, also ANTHOLOGY and PASTORAL POETRY. See P. B. Shelley, *A Defence of Poetry*, 1821; I. A. Richards, *Science and Poetry*, 1926; O. Barfield, *Poetic Diction*, 1928; P. H. B. Lyon, *The Discovery of Poetry*, 1930; G. Boas, *Philosophy and Poetry*, 1932; F. R. Leavis, *New Bearings in English Poetry*, 1932; A. E. Housman, *The Name and Nature of Poetry*, 1933; T. S. Eliot, *The Use of Poetry and the Use of Criticism*, 1933; D. Daiches, *Poetry and the Modern World*, 1941; C. M. Brown, *The Background of Modern Poetry*, 1946; F. Reid, *The Milk of Paradise*, 1946; C. D. Lewis, *Poetic Image*, 1947; and C. Brooks, *Modern Poetry and the Tradition*, 1949, and *The Well Wrought Urn*, 1949.

Poggibonsi, It. tn. in Tuscany (q.v.), 14 m. NW. of Siena (q.v.). The tn is overlooked by a fortress built by Giuliano Sangallo (q.v.), and the church of S. Lucchese has frescoes by the Gaddi (q.v.) school. There was considerable damage during the Second World War. P. is the centre of a famous wine-producing dist. (see CHIANTI). Pop. (tn) 8900; (com.) 14,300.

Pogonophora, a class of marine bottom-dwelling invertebrate animals found in deep-sea regions of the E. Indies and the NW. Pacific. The first specimen was brought back by the Siboga Expedition (1899) and described by Caullery in 1914. Recent Russian Expeditions have obtained numerous individuals from the NW Pacific. The P. are elongated tubedwelling animals with a crown of tentacles. Below the tentacles there is a short anterior section followed by a long trunk. There are 3 pairs of oelomic cavities, the small anterior pair containing nephridia. The second pair is connected with the oelomic cavities of the tentacles, while the third pair contains the reproductive organs. There is no mouth or anus. Presumably the detrital or bacterial food is collected by the tentacles.

Pogrom, Russian word, meaning 'devastation,' and originally used to denote any organised persecution of any class of persons obnoxious to the Russian Gov., but generally applied to the massacres of Jews. The word 'pogromy' is used by Herman Rosenthal (see article on 'Russia' in the *Jewish Encyclopaedia*) as meaning 'riots.' P.s (of Jews) ceased altogether in Russia after the Bolshevik revolution. They were introduced in Germany by Hitler as an integral feature of the racial doctrines of *Mein Kampf* (q.v.). The immediate cause of, or excuse for, the general P. organised on 10 Nov. 1938 was the assassination of von Rath, an official of the Ger. Embassy in Paris, by a Jewish youth from Poland. See ANTI-SEMITES; GENOCIDE; PROTOCOLS OF THE ELDERS OF ZION.

Pohai Bay, see CHIHLI, GULF OF.

Pohutukawa, *Metrosideros tomentosa*, an evergreen tree, 30-70 ft tall, with oval, shining dark-green, leathery leaves, white beneath, and rich crimson, many-stamened flowers in terminal clusters, persisting from summer into the winter; native to the coasts of New Zealand, where it is known as the New Zealand Christmas tree; it requires greenhouse culture in Britain.

Poitiers, see POITIERS.

Poincaré, Jules Henri (1854-1912), Fr. mathematician and physicist, b. Nancy. Amongst his works on cosmogony are *Les méthodes nouvelles de la mécanique céleste*, 3 vols., 1892, 1893, 1899, and *Leçons de mécanique céleste* (3 vols.), 1905-10. He was made prof. at the Paris Univ. in 1886, and elected to the Academy of Sciences in the following year. He discovered a new series of functions, to which he applied the term 'Fuchsian,' after Fuchs. In 1889 he won the King of Sweden's prize by his essay on the problem of 3 bodies and dynamic equations. His works include *Sur la théorie des fonctions fuchsienues*, 1881; *Cours de physique Mathématique* (13 vols), 1890 seqq.; *Théorie de courbures*, 1893; *La Théorie de Maxwell et les oscillations herziennes*, 1899; *La Science et l'Hypothèse*, 1903; etc.; see above for other works. See lives by G. Lebon (2nd ed.), 1912, and P. Appell, 1925.

Poincaré, Raymond Nicolas Landry (1860-1934), Fr. statesman; b. Bar-le-Duc. Educ. at the Lycée de Bar-le-Duc and the Lycée de Louis le Grand, he became a lawyer, and was for some time law-editor of *Le Voltaire*. P. was elected a Republican deputy for the Meuse in 1887; was a senator from 1903; minister of public instruction, 1893 and 1895; minister of finance, 1894-5 and 1906. In 1909 he was elected to the Academy. In Jan. 1912 he succeeded Caillaux as Prime Minister, becoming also foreign minister. He pursued a strong policy in Morocco, obtaining the sultan's recognition of the Fr. protectorate. He also enlarged the fleet. In 1913 he was elected president of the rep. in succession to Fallières; Briand became Premier. P. visited Britain that year, and in July 1914

he visited Russia; on his way back he heard of the Austrian ultimatum to Serbia, and wrote a personal letter to George V on the crisis (31 July). Amid the reverses of the war at the end of 1917 P. accepted as Premier his old opponent Clemenceau. P.'s term as president ended in 1920: he was succeeded by Deschanel, and re-entered the Senate. In Jan. 1922 he again became Prime Minister and foreign minister. Holding that Germany had defaulted, his gov., with that of Belgium, occupied the Ruhr, 1923. In 1924 he had to impose fresh taxation; the elections of that year went against him, and he resigned. An acute financial crisis, which destroyed one ministry after another with rapidity, resulted in his recall to power in July 1926. By new laws and drastic administrative decrees, he rapidly stabilised the franc, and his gov. endured until July 1929, when he resigned on grounds of health. P. pub. his memoirs under the title of *Au Service de France*, 1926-33. He also wrote literary, political, and scientific essays. See lives by H. Girard, 1913, and S. Huddleston, 1924; see also G. Wright, *Raymond Poincaré and the French Presidency*, 1943.

Pointing, in Scots law, denotes the process of 'attaching' the movables of a debtor to satisfy his debts. P. is either *real* or *personal*. *Real P.* or *P. of the ground* is the remedy of the *real* creditor or creditor whose debt is secured by a lien over or charge on land, or who holds a heritable security. *Personal P.* is the remedy of creditors in ordinary personal obligations, and affects the debtor's goods and effects generally.

Poinsettia, see EUPHORBIA.

Point, see GEOMETRY.

Point (Type Height), see METROLOGY

TYPE and TYPEFOUNDING.

Point de Galle, see GALLE.

Point System, see TYPE and TYPE-SETTING.

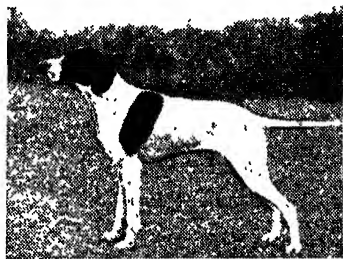
Point-to-Point Steeplechases. Steeplechases were so called in the first instance because they were races run from 'point to point,' the most prominent point, near which the finish was to take place, being a steeple or church spire. These early steeplechases were genuine races across country between 2 or more persons, and required a very good 'eye for country' as well as a sure seat in the saddle. One of the earliest steeplechases run was that in Ireland between a Mr O'Callaghan and a Mr Blake in 1752, from the church of Buttevant to the spire of St Leger church, a distance of 4½ m. Records exist of other steeplechases of a similar nature being run in 1792 and 1824, but prior to 1831 there were generally only 2 or 3 participants, and no reference is found to a regular 'field.' As these fixtures grew in popularity and the number of entries increased, the nature of the races gradually became changed; the spectators grew in number, and naturally wished to see all the race if possible. Thus the modern steeplechases, of which the Grand National is the most important, came into being; they are, however, not at all similar to

the early 'point-to-point' chases, of which the modern representatives are those held by the various hunts at the end of the hunting season (for full details, see *Baily's Hunting Directory*, pub. annually). Nearly all, if not all, P.-to-P. S. are now run over made-up fences on a set course. At nearly every P.-to-P. there is at least one 'open' race in which horses from other hunts can take part, and these generally provide the highest-class race of the day. See rules for P.-to-P. S. in *Ruff's Guide to the Turf*, etc.

Pointe-à-Pitre, seaport of Grande-Terre, Guadeloupe, Fr. W. Indies, 21 m. NE. of Basse-Terre, with a large trade and a good harbour.

Pointed Architecture, see ARCHITECTURE, VI.

Pointer, popular sporting dog, descended from Sp. dogs imported in the 18th cent. and crossed with foxhounds, a cross which has been employed to impart additional speed and dash. The P. is easily trained to point (i.e. stopping dead and remaining rigid when it finds game at close quarters), and in America has been taught to retrieve. Some very good P.s have been of small size, but a big dog stands about 25 in. at the shoulder and weighs 60 lb. The colour of the coat may



POINTER

T. Fall

be black, black and white, orange and white, lemon and white, or liver and white, probably the most popular colour. The skull should be rather wide between the ears with marked drop at the top, the muzzle long, nose dark liver or flesh colour, ears set low and hanging flat to the head, neck well arched, shoulders, sloping, chest wide and deep, body well ribbed up the loins, forelegs straight, hind-quarters powerful, and tail short and tapering.

Pointillism, see IMPRESSIONISM.

Points Rationing, see FOOD CONTROL, BRITISH, IN WAR-TIME.

Poiré, Emmanuel (1858-1909), Fr. draughtsman, better known by his pseudonym 'Caran d'Ache' (lead pencil). B. Moscow, the grandson of one of Napoleon's officers, he returned to France with the intention of being a military painter, and served 5 years in the Army, being largely employed in drawing uniforms.

He subsequently made his name by humorous drawings for *La Vie Parisienne*, *La Caricature*, and other periodicals. With very effective economy of line and a minimum of verbal explanations, he developed a 'comic strip' technique that gave him great popularity in both France and England.

Poison Gas, see CHEMICAL WARFARE; PHOSGENE.

Poisoning, Food, see FOOD POISONING.

Poisonous Plants. A large number of plants contain poisonous principles, many of which, under proper control, are valuable drugs. Among the commoner Brit. plants that are poisonous wholly or in part are the crowfoots, monkshood, the hellebores, baneberry, pasque flower, greater celandine, horned poppy, white bryony, henlock, fool's parsley, water hemlock, water dropwort, wood sanicle, deadly nightshade, bittersweet, henbane, thorn apple, foxglove, spurge laurel, the spurges, dog's mercury, black bryony, daffodil, bluebell, meadow saffron, cuckoo pint, sorrel, wood sorrel, the elders, box, buckthorn, yew, as well as many fungi (q.v.). Many commonly cultivated plants and trees are poisonous.

Poisons. There is no satisfactory definition of P. which will embrace all the examples, but substances which on entering the body and being in any degree absorbed produce death or injure health, though not by mere mechanical derangement, are poisonous. Introduction to the body may be by the mouth, by inhalation, by injection, or by absorption through the skin. Further, a poisonous substance is usually considered such by virtue of its own inherent qualities. Most drugs are poisonous if the dose is large enough, and the possibility of deciding a commonly injurious dose might form the basis of definition, were it not that different constitutions react with marked difference, and the dose may be increased by habitual taking. P. have been known and used for a very long time, and in particular the Borgias are reputed to have reduced poisoning to a 'fine art.' Classification may be according to source: vegetable, animal, or mineral; or to chemical nature: organic, inorganic, acid, alkaloid. Blyth employs the following classification: poisonous gases; P. capable of separation by distillation; alkaloids; P. extracted with alcohol; P. derived from animal substances; the oxalic acid group; inorganic P. A common classification is: narcotic, corrosive, irritant, convulsant. Narcotics produce giddiness, drowsiness, headache, disturbance of the sight, paralysis of the voluntary muscles; they may act specially on the brain and spinal cord, and may at first produce excitement. Opium, henbane, chloral, chloroform, ether are examples. Corrosives, such as spirits of salt, stain and blister the lips and mouth, burn the throat so that breathing and swallowing are affected. Vomiting, diarrhoea, and intense stomachic pain ensue. Corrosive perforation, gangrene, and perforation of the alimentary tract to a varying distance

are found. Irritants include oxalic and tartaric acids, ammonia, white and yellow arsenic, mercury salts, sugar of lead, copper arsenic, blue vitriol, verdigris, phosphorus, croton oil, various zinc, antimony, and iron salts, such as green vitriol, cantharides, etc. In continued small doses they cause indigestion, occasional vomiting, discomfort after food, general illness, and wasting. Convulsants such as strychnine create spasms of the throat and limbs and trunk, the breathing being difficult, the jaws and fists clenched. Death is due to suffocation or exhaustion, but consciousness is not affected. Among cumulative P. are the salts of mercury, antimony, lead, trional, strychnine, and digitalis. Certain gases are poisonous; carbon monoxide, carbon dioxide, hydrogen sulphide, coal gas, arsine are among these. Accidental or unintentional poisoning is often due to fungi or other poisonous plants (see above). Tinned meats, shellfish, sausages, fish, etc., give rise to ptomaine poisoning. Phosphorus poisoning is occasional in the manuf. of matches; lead poisoning, with blue line on the gums and wrist-drop, in the manuf. of lead-glaze. Arsenic has been mistaken for sugar; carbolic, oxalic, prussic acids are, through inadvertence, sometimes taken, as also overdoses of sleeping-draught. Opium smoking and laudanum drinking (see DE QUINCKY) become a habit which leads to greater and greater doses and to grave moral as well as physical degeneration. White arsenic is taken by mountaineers of Syria to add to endurance, and by some women for the complexion. Injections of morphia to relieve pain or to induce sleep, etc., are used regularly. Strychnine is useful in small doses as a tonic, and digitalis is employed in diseases of the heart. One S. Amer. arrow poison, curare, is now employed in medicine for its relaxing effect on the muscles, e.g. in anaesthesia and in the treatment of tetanus.

Treatment. In narcotic poisoning emetics should be given: a tablespoonful of salt or mustard in warm water; ipecacuanha wine, a tablespoonful every 2 or 3 minutes; half a teaspoonful of sulphate of zinc in a wineglassful of water. The throat may be tickled with a feather, or the finger passed to the back of the mouth. Meanwhile the patient should be clothed warmly, and hot things applied to the feet and over the heart. Cold water dashed in the face will rouse from stupor. After the emetic has acted well, plenty of strong coffee should be given. In the case of opium, laudanum, morphia, morphine, recognised by 'pin-point' pupils, administer emetic, rouse from stupor; it is necessary to keep the patient walking long after he seems all right; strong coffee should be given frequently from the first; potassium permanganate is an antidote. Wherever there is great prostration stimulants are given; when breathing is slow or shallow, it is advisable to apply artificial respiration (q.v.). Emetics should not be given for chloroform

poisoning. For irritant poisoning, if an acid has been taken, alkaline substances should be given, such as magnesia, powdered chalk, whiting, carbonate of soda, washing-soda, soap, plaster scraped from the ceiling and mixed with milk. After neutralising the acid, the pain can be soothed by administering milk, white of egg, flour and water, thick barley-water, linseed tea, olive oil, yolk of egg. For alkali poisoning vinegar, citric acid, lemon-juice and water, tartaric acid are administered. Emetics are never given for poisoning by alkali or acid. Carbolic acid poisoning should, however, be treated by emetics as well as soothing drinks. Coal-gas poisoning: the patient should be taken into the fresh air; windows should be opened or broken; clothing of neck, chest, and waist should be loosened; if the patient is unconscious cold water can be dashed in the face. Artificial respiration should be applied, and oxygen given if available. In any case the doctor, who may apply the stomach pump, should be sent for. Injected P. require counter injections. For further specific remedies see ANTIDOTE. For poison gas see CHEMICAL WARFARE.

See Sir S. Smith and F. S. Fiddes, *Forensic Medicine* (10th ed.), 1956; F. E. Camps and W. B. Purchase, *Practical Forensic Medicine*, 1956.

Poisson, Jeanne Antoinette, see POMPADOUR, MADAME DE.

Poissy, Fr. tn in the dept of Seine-et-Oise, on the edge of the forest of St-Germain. It has a beautiful 12th-cent. church. St Louis (see LOUIS IX) was b. here. Furniture, flour, and machinery are manuf. Pop. 13,400.

Poitiers, Diana of, see DIANE DE POITIERS.

Poitiers (ancient Limonum), Fr. tn, cap. of the dept of Vienne, at the confluence of the Clain and the Boivre, 60 m. SW. of Tours (q.v.). It was formerly the cap. of Poitou (q.v.). It dates from Rom. times, and was later an important tn in the Visigoths (see GOTHs). Near by Alaric II was slain by Clovis I (qq.v.) in 507. During the long wars between the English and French in the Middle Ages there was much fighting in the neighbourhood of P.; at the battle of P. in 1356 Eng. and Gascon forces, under the Black Prince (q.v.), defeated the troops of Jean le Bon, and took him prisoner. There is a splendid, ornamented Romanesque church (11th-12th cents.) called Notre-Dame-la-Grande, and another fine Romanesque church, St-Hilaire-le-Grand. The baptistery of St-Jean dates from the 4th cent. Other notable buildings are the *hotel de ville*, the *Palais de Justice*, and the univ. (1432). The chief industries are the manuf. of textiles and brewing. Pop. 49,000.

Poitou, former prov. of W. France, is now mainly comprised in the depts of Deux Sèvres, La Vendée, and Vienne. Henry II of England acquired it as part of the dowry of Eleanor of Aquitaine, and it was finally united to the Fr. crown in 1369. Cap. Poitiers.

Poker. This is a game essentially Amer. in origin. It has sev. variations—'Draw,' 'Straight,' 'Stud,' and 'Whisky.' 'Draw' P. appears to be the most popular form, and is practically synonymous with P. In 'draw' P. a single pack of cards is used. Five cards are dealt to each of generally half a dozen players, with the right to 'draw' 5 more. The object of the game is to make the best 'hand' according to certain combinations of cards. These combinations in order of value are: (1) A *straight flush*, i.e. a sequence of 5 cards all of the same suit. As between 2 sequences, the player whose sequence begins with the higher card has the preference. The ace may be regarded either as the highest or the lowest. (2) *Fours*, i.e. 4 cards of the same denomination with 1 indifferent card, the higher 4 having preference. (3) A *full*, i.e. 3 cards of the same denomination and a pair. (4) A *flush*, i.e. any 5 cards of the same suit. (5) A *straight*, i.e. 5 cards in sequence, but not of the same suit. (6) *Three's*, i.e. 3 cards of like denomination, with 2 indifferent cards. (7) *Two pairs* with an indifferent card. (8) A *pair* with 3 indifferent cards. (9) *Highest card*, where no hand has any one of the previously enumerated combinations. As between pairs or sequences in opposing hands, the higher wins. Where each holds 2 pairs the 2 best are compared, and the higher wins. Where pairs are equal the highest indifferent card wins. If the equality is absolute the pool is divided.

A certain amount is fixed upon as the limit to the initial stake. One player starts the pool with a preliminary stake called the 'ante,' which must not exceed half the limit. Such preliminary stake is made without looking at the hand, and is for that reason also called a 'blind.' The player who has the privilege of putting up the preliminary stake is the 'age,' or person who sits on the left of the dealer; the deal passes from right to left. A player whose hand is so bad as to offer small chance of winning may 'pass,' i.e. go out of the game altogether for that hand. If not he puts in the pool *double* the stake put in by the 'age,' and the other players may do the same in rotation. When the turn comes round to the 'age' he may either put into the pool an amount equal to his 'blind' or pass. If, however, the 'age' has put in as the 'ante' the minimum, the next player may if he choose first make good the 'ante' by doubling it and then 'raise,' i.e. offer a higher stake not exceeding the limit. Each subsequent player who wishes to go still better must first put in as many counters as his predecessors and then something in addition. When under these circumstances the turn comes round to the 'age' again, he may regain the lead by putting in the same amount less one (his 'ante') as that of the highest stake. After this bidding comes the time for 'drawing' cards. After the 'draw' is completed, betting is resumed. The 'age' has the right of reserving his stake

until the other players have declared whether they will stake more. Where a player at this stage does not elect to stake higher than his neighbour, but yet wishes to remain in the game, he says 'I'll see you'; this simply makes good the last 'raise.' When this last round of betting is over the players turn up their cards; the best hand according to the classification above wins and takes the pool. In the ordinary 'draw' P., where the whole table declines to 'go in,' the 'age' reproaches his 'ante' and the deal passes to the next player, no one being any the worse off. In the 'jack-pots' variety of 'draw' P. each player, in such a contingency, puts up an equal amount to the 'ante,' and the cards are dealt by the next player. There is no 'age,' but if any player happens to hold a pair of jacks, or anything better, he opens 'the jack-pot' by putting down any stake he pleases. The other players in rotation must either make this good or go out. Anyone may 'raise.' This goes on until one player says he will 'see' his predecessors. The cards are then declared and the best hand wins.

'Straight' P. or 'Bluff' differs from 'draw' in these particulars: (a) the 'age' has no privilege; (b) the deal passes to the winner of the pool, and not in rotation; (c) a player who has passed is not excluded altogether unless some other player has raised in the meantime; (d) each player puts up an amount agreed upon beforehand by way of 'ante'; and (e) there is no 'drawing,' each retaining the first cards dealt him.

Other games are 'Stud,' a species of Straight' P., 'Whisky' P., and P. patience.

Poker-drawings, or Pyrography, decoration of wood by partially burning or charring. The design is thus produced in various shades of brown and black. It may be executed with small heated skewers of various sizes, with an electrically heated platinum point, with a blow-pipe, and with a hollow platinum point heated internally by vaporized benzoline. Woods generally chosen include cedar, elm, and chestnut. Leather and velvet materials are often so decorated.

Pokrovskiy, Mikhail Nikolayevich (1868-1932), Russian historian and politician, pupil of Klyuchevskiy (q.v.). In 1905 he joined the Bolshevik faction of the Russian Social Democratic Labour party (q.v.), and in 1909 the Left-wing Bolshevik sub-faction 'Forward' led by Bogdanov (q.v.). After the seizure of power by the Bolsheviks in 1917 (see OCTOBER REVOLUTION) he was chairman of the Moscow Soviet (see SOVIET), and 1918-32 deputy commissar (minister) of education. In 1918 P. was one of the Left Communists (see BUKHARIN; LEFT OPPOSITION). He was founder and head of many institutions and organisations aimed at establishing Communist party (see COMMUNIST PARTY OF THE SOVIET UNION) control in the field of learning (Communist Academy, Institute of Red Professorship, Society of Marxist Historians, etc.). P.'s view that history is 'politics turned to the past' is still

characteristic of Soviet historiography, although P.'s school was 1934-6 officially declared erroneous and replaced by the National Bolshevik (see NATIONAL BOLSHEVISM) school of Grekov (see GREKOV; ZHDANOV). See his *Brief History of Russia*, 1933.

Pola, see PULA.

Pola de Lena, Sp. tn in the prov. of Oviedo, near to which are the remains of a 9th-cent. church. Pop. 6000.

Polacca, type of It. merchant vessel at one time used on the E. waters of the Mediterranean. It was built with 3 masts each made in 1 piece, square rigged, with neither tops, caps, nor cross-trees, and with square or lateen-shaped sails.

Poland (Polska Rzeczpospolita Ludowa), rep. of E. Central Europe, lying N. of the Carpathians and SE. of the Baltic (qq.v.). It is bounded on the E. by Russia, on the S. by Czechoslovakia, and on the W. by Germany. The present area is about 20 per cent less than that of 1939. At the end of the Second World War P. lost to Russia about 46 per cent of her former ter. (Vilna, Polesie, Nowogródek, Wołyń, Tarnopol, Stanisławów, and parts of Lvów and Białystok). In the W., however, P. gained some 40,400 sq. m. of ter. from Prussia, thus bringing the boundary of the country to the line of the Rts. Oder and Neisse (qq.v.). The E. boundary is the Curzon Line (q.v.). P. has, thus, obtained over 300 m. of coast-line on the Baltic. The incorporation of these 'regained ters.' (*ziemie odzyskane*) into the State is still disputed. Area 120,350 sq. m.

Geography. P. lies mostly in the great European plain, bordered on the S. by the Carpathian and Sudetic Mts (qq.v.). N. of the mts lies the Polish plateau, watered by the Vistula, the Bug, and the San; in the W. (Silesia) are the richest coal deposits in Europe. The Baltic coast is in general flat and sandy. The only notable harbours are on the estuaries of the Vistula and the Oder. The climate is continental. There is much snow in winter, and the rvs. are frequently frozen in the months Dec.-Mar. Nearly one-quarter of the surface of the country is forested; the prin. trees are pine, yew, beech, and birch. There are steppe lands on the plateau. Bison, elk, lynx, fox, and chamois are found.

Constitution. P. is a 'People's Republic.' According to the Constitution of 1952, authority in the State is vested in the *Sejm*, which is elected for 4 years by the votes of all citizens over 18 years of age. The *Sejm* elects a Council of State, composed of a Chairman, a Secretary, and 12 members. It also elects a Council of Ministers, the supreme executive and administrative organ. Local administration is in the hands of the People's Councils, elected for 3 years in voivodships, dists., boroughs, tns, and vlls.

Local Administration and Justice. The country is for administrative purposes divided into 19 voivodships (*województwa*): Warsaw City, Warsaw, Łódź City, Łódź, Kielce, Lublin, Białystok, Olsztyn, Gdańsk, Bydgoszcz, Szczecin,

Poznań, Wrocław, Katowice, Kraków, Rzeszów, Koszalin, Zielona Góra, Opole (qq.v.).

The following law-courts exist: the Supreme Court; voivodship, dist., and the special courts. The judges of the Supreme Court are elected by the State Council for a term of 5 years. Other judges and lay assessors are also elected.

Population, Religion, Education, Chief Towns. In 1939 the pop. of P. was over 35,000,000. The official estimate of pop. in 1956 was 27,500,000. Some 2,000,000 Poles have been transferred from ters. ceded to Russia. Germans living in the 'regained ters.' have been expelled. It is estimated that about 6,700,000 Poles d. during the Second World War.

The great majority of the pop. is Rom. Catholic. Since the events of 1956, the attitude of the gov. to the church has changed considerably, and many of the post-war restrictive measures have been relaxed. See HISTORY (below).

Education up to the age of 14 years is free and compulsory. There are about 23,000 primary schools, 800 secondary schools, and 1150 vocational schools. There are univs. at Warsaw, Łódź, Poznań, Cracow, and Wrocław.

The prin. tns are Warsaw (the cap.), Łódź, Cracow, Wrocław, Poznań, Szczecin, and Gdańsk (qq.v.).

Production. In 1939 60.6 per cent of the pop. lived by agriculture; by 1950 this figure had been reduced to 45.75 per cent. The prin. industries of the country have been placed under state control, and in all industries planned economy has been introduced. The result has been a transformation of the economic structure of the country. The chief crops are wheat, rye, barley, oats, potatoes, and beet. Tobacco and flax also are grown. Horses, cattle, pigs, goats, and poultry are raised, and fishing is important. The chief mineral resource of the country is coal (in the Silesian coalfields), but zinc, iron, oil, natural gas, and salt are also found. Industries include iron, steel, and zinc manufs., and the manuf. of paper, textiles, machinery, chemicals, and cement. A large part of the industrial capacity of the country is in the 'regained ters.'

Communications. There are over 60,000 m. of roads and over 18,000 m. of railway tracks. The Polish mercantile marine comprises 142 vessels of a combined tonnage of 291,063. The prin. ports are Gdynia, Gdańsk, Szczecin, and Kołobrzeg. There are some 3000 m. of inland waterways, including about 2300 m. of navigable rvs., and 148 m. of canals. The national air-line, 'Lot', has a number of airfields, and internal air traffic increases annually.

Defence. P. is divided into 3 military dists.: Warsaw, Pomerania, and Silesia. The Army has, since 1950, been modelled on the Soviet Army. Male citizens are liable to service from the age of 20 years to the age of 50 years. Officers are required to learn Russian. The strength of the armed forces is about 300,000, and that of the security troops about 70,000.

Currency, etc. The unit of currency is the *zloty*, which equals 100 *groszy*. There are notes of 500, 100, 50, 20, 10, and 2 *zlotys*; and coins of 1 *zloty*, 50, 20, 10, and 2 *groszy*, and of 1 *grosz*. The *zloty* is equivalent in value to the rouble.



Polish Embassy

POLAND: THE TATRA MOUNTAINS
The Muich peak and Morskie-Oko
(Sea's Eye) Lake

History. The Poles are a branch of the Slavic (q.v.) family. The name appears first in hist. as the designation of a tribe, the Polani, who dwelt between the Oder and Vistula. Sev. Polish historians claim that they can trace P.'s hist. as far as the 4th cent., but the lists of rulers which they give are probably those of separate tribes and not of the combined race now known as Poles. At any rate, the hist. of P. previous to the middle of the 9th cent., is so intermingled with fables as to be very untrustworthy. Ziemowicz, said to be the second monarch of the Piast dynasty, is considered to be the first ruler whose hist. is to any extent reliable, and it was not till a century later, when his descendant, Mieszko I (962-92), occupied the throne, and became a convert to Christianity, that P. took her place as one of the political powers of Europe. Mieszko divided his dominions among his sons, but one of them, Boleslaw I (992-1025), surnamed the 'Great,' soon re-

united the separate portions, and extended his kingdom beyond the Oder, the Carpathians, and the Dniester, and sustained a successful war with the Emperor Henry II of Germany, conquering Cracovia, Moravia, Lusatia, and Misnia. To the E. he extended the Polish frontier as far as Kiev. He is regarded as the real founder of the Polish state. After a period of anarchy he was succeeded by his son, Casimir (1034-58). Boleslaw II (1058-81), who succeeded Casimir, murdered the Bishop of Cracow in 1079. P. was then laid under the papal interdict, and he is said to have committed suicide (1081). Boleslaw III (1102-39), an energetic monarch, annexed Pomerania, defeated the pagan Prussians, and defended Silesia against the Ger. emperors. A div. of his kingdom among his sons caused much internal dissension, under cover of which Silesia was severed from P., though still nominally subject to it. Ultimately Casimir II (1177-94) reunited the severed portions, with the exception of Silesia, and estab. on a firm footing the constitution of the country.

The Mongols swept over the country in 1241, bringing it near ruin, and defeating the Poles in a great battle near Wahlstatt. P. began then to decline; various dists. were ceded to the margraves of Brandenburg, while many dists. began to be colonised by Germans. Numbers of Jews, persecuted in W. Europe about this time, took refuge in P. Wladislaw (1305-33), surnamed Lokietek (the Short), again restored unity to the country.

Judicial abuses and all illegally acquired privileges were abolished, and the first Diet (1331) assembled for legislative purposes. In conjunction with Gedymin, Grand Duke of Lithuania, a vigorous and successful war was carried on against the Teutonic Knights. Wladislaw's son, Casimir III the 'Great' (1333-70), greatly increased the power and prosperity of P. by pursuing a peaceful policy, amending the laws and consolidating his terr. by profitable exchanges with the neighbouring powers. With Casimir, the Piast dynasty became extinct, after 510 years, according to the old Polish chroniclers. His nephew, Louis the Great, King of Hungary, succeeded him, by the will of the deceased monarch and the election of the Diet, but during his reign P. was treated merely as an appanage of Hungary.

On his death without male heirs, the crown fell to the Jagello (Wladislaw IV), Grand Duke of Lithuania, the son-in-law of Louis, who founded the dynasty of the Jagellons (q.v.) (1386-1572), and for the first time united Lithuania and P., thus doubling the extent, though not the pop., of the kingdom. However, his successor, Wladislaw V, was acknowledged only in P. proper, the Lithuanians preferring the rule of the younger son, Casimir. Wladislaw was also chosen King of Hungary, and fell at the battle of Varna, being succeeded in P. by Casimir IV (1424-92), who again united it to Lithuania. Casimir recovered W. Prussia from the Teutonic Knights, and compelled them to do homage for E.

Prussia. Sigismund I (1507-48), surnamed the Great, the fourth son of Casimir, gave P. great prosperity; he was, however, forced into a war with Russia, in which he lost Smolensk, but he was partly compensated by obtaining lordship over Moldavia. His son, Sigismund II, Augustus, was a worthy successor. During his reign Lithuania was finally joined indissolubly to P., and from this time there was to be but one Diet for the united realm. The pop. almost doubled itself under the 2 Sigismunds, but this dynasty, under whom P. profited greatly, ceased with them. The warrior class decided to preserve their own freedom by making the monarchy elective. The first elective monarch was Henry of Valois (III (q.v.) of France), who, however, soon abandoned the throne for that of France, and was succeeded by Stephen Batory (1575-86), *voivode* of Transylvania, a man of energy and talent, who carried on war successfully against the Russians. His successor, Sigismund III (1587-1632), who was succeeded by his sons, Wladislaw VI (1632-48) and John Casimir (1648-68), was of the Vasa family, and was the crown prince of Sweden; but his election, far from cementing a bond of union between the two countries, only embittered former dissensions. These 3 Swedish monarchs had neither talents for governing nor characters and sentiments congenial to a war-like nation. But the Polish armies, though, like the rest of the nation, neglected, were victorious everywhere; the Swedish and Muscovite armies were both annihilated; Moscow was taken, and the Russians completely defeated. During the reign of this dynasty, Wallachia and Moldavia were snatched by the Turks from under the Polish protectorate; Livonia with Riga was conquered (1605-21), along with part of Prussia (1629), by Sweden; and Brandenburg estab. itself as an independent power.

In the reign of John Casimir, P. was attacked simultaneously by Russia, Sweden, Brandenburg, the Transylvanians, and the Cossacks. The country was entirely overrun, Warsaw, Vilna (Wilno), and Lemberg taken, and the king compelled to flee to Silesia. Czarniecki, however, succeeded in defeating all P.'s enemies, and they were driven from the country. But in the subsequent treaties, Ducal or E. Prussia was wholly given up to Brandenburg, almost all Livonia to Sweden, and Smolensk, Severia, or Tchernigov, and the Ukraine beyond the Dnieper were given to Russia. Michael Korybut (1668-73), the son of a famous gen., was elected as their next monarch. A war with Turkey, concluded by an ignominious peace, was the chief event of his reign. After some dissensions concerning the election of a successor, John Sobieski (1674-96) was chosen, but his reign, though it brought military glory to P., did not improve internal administration. As Sobieski's successor, the prince of Conti was legally elected and proclaimed king, but the cabinet of Versailles allowed this splendid opportunity of becoming supreme in Europe to

escape, and Augustus II of Saxony, a protégé of the house of Austria, entered P. at the head of a Saxon army, and succeeded in obtaining the throne. His war with the Turks restored to P. part of the Ukraine and the fortress of Kaminiac, but that with Charles XII brought nothing but misfortune. The war with Sweden was unpopular in P., in fact, the Poles of the E. provs. received Charles gladly; but his attempt to force upon them Stanislaw Leszczyński as their king severely wounded their national pride. Augustus returned after the battle of Poltava (q.v.), his rival retired without a contest, a close alliance was formed with Russia, and the Russian troops who had campaigned in P. against the Swedes were, along with his Saxon army, retained. The Poles demanded their extradition, but in vain, and the Russian cabinet interfered (1717) between the king and his subjects, compelling both parties to sign a treaty of peace. This was the commencement of P.'s dependence on Russia, and her consequent obliteration as a great power.

The succeeding reign of Augustus III of Saxony (1733-63) was of the same character; the gov. fell more and more under Russian influence, and its political relations with other countries gradually ceased. On the death of Augustus the cabinets of St Petersburg and Berlin presented to the Poles Stanislaw Poniatowski, who was totally incapable for such office, as their king. This led to a Polish bid for independence. The 'Confederation of Bar' (so called from Bar in Podolia) was formed by a few zealous patriots, an army was assembled, and war declared against Russia. Frederick the Great of Prussia, who had formerly gained the consent of Austria to a partition of P., now, in 1770, made the same proposal to Russia, and in 1772 the first partition was effected. The country now fully realised its danger, and classes which had long been divided began to unite. The Diet of the diminished kingdom laboured to amend the constitution and strengthen the administration. In this they were encouraged by Prussia, whose new king, Frederick William II, swore to defend them against Russia; but Prussia proving traitorous, a second fruitless resistance to the united Prussians and Russians, headed by Kosciuszko (q.v.) was followed by a second partition (1793), which the Diet were made to sanction by the threat of armed force. The Poles now became desperate; a general rising took place (1794), the Prussians were compelled to retreat to their own country, and the Russians were sev. times routed; but then a new enemy appeared on the scene. Austria was chagrined at having taken no part in the second partition, and was determined not to be behindhand on this occasion. Her army accordingly advanced, compelling the Poles to retreat, and, fresh hordes of Russians arriving, Kosciuszko, at the head of the last patriot army, was defeated, and the sack of Praga, followed by the capture of Warsaw, finally annihilated the Polish monarchy.

On the third and last partition (1795, King Stanislaw resigned his crown, and d. at St Petersburg in 1798.

The subsequent success of the French against the Russians, and the tempting promises of the Emperor Napoleon to reconstitute P., rallied round him a faithful army of patriots who distinguished themselves in the campaigns of the French against Russia and Austria; but all that Napoleon accomplished in fulfilment of his promise was the estab., by the treaty of Tilsit (1807), of the duchy of Warsaw. On the fall of Napoleon the remnant of P. was granted a constitution which continued to 1830, its separate gov. lasting till 1864. Four years later P. became Russian ter., its name being erased from the map. Polish independence was regained after the First World War. Russian P. was captured by the Germans, who promised independence and set up a regency council, a monarchy being intended. In 1918 a constituent assembly was called, and on 9 Nov. a republic was proclaimed, recognised under the peace treaties. The boundaries of P. were: in the N. the Baltic Sea, E. Prussia, and Lithuania (fixed by the council of ambas., 15 Mar., 1923); in the S. Czechoslovakia and in the SE. Rumania; in the E. Russia, determined by the treaty of Riga, 18 Mar., 1921; in

ter., cutting E. Prussia off from the rest of Germany. It was a stretch of land connecting P. with the Baltic Sea, narrowing towards the coast (smallest width (10 m.), broadest at its base (60 m.)). The provisional gov. under Maracewski collaborated with Pilsudski (q.v.), president, and by arrangement Paderewski, head of the Polish National Council in Paris, returned to P., becoming Premier in Jan. 1919. In Dec. he resigned in favour of Skulski. In war with Russia the Poles captured Kiev, 8 May, 1920, but a Russian counter-offensive was only checked outside Warsaw. A peace conference opened at Minsk on 17 Aug., but hostilities continued until P. concluded an advantageous peace at Riga on 12 Oct., 1920, ratified on 18 Mar., 1921.

P. quarrelled with Lithuania over Vilna, which eventually became Polish in 1922. In 1921 the Upper Silesian plebiscite was carried out. During the next few years repeated financial crises weakened the democratic parties in P., and in 1926 Pilsudski seized power by a military coup, and made himself Premier. Pilsudski's dictatorship was marked by improved foreign relations. In Sept. 1926 P. was admitted to the League of Nations. In Dec. 1927 the 'state of war' with Lithuania ended. P. adhered to the Kellogg Pact and the Russian protocol, agreeing to an E. European peace pact. On 25 June, 1928 Pilsudski resigned, becoming minister of war in Bartel's Cabinet, which in April 1929 was succeeded by Switalski's 'Government of the Colonel'. The opposition of the *Sejm*, which at last met on 5 Dec., again brought in Bartel's ministry (29 Dec.). In foreign affairs a mutual agreement cancelling war debts was signed with Germany (3 Oct., 1929) and a provisional commercial treaty to end tariff war on 17 Mar., 1930. On 15 Mar. Bartel resigned and Pilsudski decided to crush the Centre and Left opposition in the *Sejm*, which was prorogued. Pilsudski assumed the premiership. General elections in which the opposition was intimidated were held in Nov., resulting in a gov. majority. Pilsudski then resigned the premiership, but remained minister of war and, as such, was the real ruler of P. until his death in 1935.

A major cause of P.'s insecurity arose from the fact that the republic of 1918 contained large racial minorities carved out of the Polish-speaking parts of Austria, Germany, and Russia, totalling more than 10,000,000 people. These minorities caused friction between P. and her neighbours. She therefore relied increasingly on her alliance with France. Economic and social difficulties also caused unrest, though under Pilsudski these troubles were masked. In the succeeding period P. continued to be ruled dictatorially by the military clique known as the 'Colonel's Group' in collaboration with the owners of large estates. In 1934 a non-aggression pact had been concluded with Germany, which weakened P.'s ties with France. Under Pilsudski's successor, Smigly-Rydz, a new constitution was adopted, which, in



E.N.A.

POLAND: A YOUNG GIRL OF LOWICZ

the W. Germany, the Ger.-Polish frontier in Upper Silesia being decided by plebiscite. The corridor, called the prov. of Pomorze (the seaside) in official Polish usage, was given to P. in 1919 as an outlet to the sea. It passed across former Ger.

effect, ousted all but non-partisan or gov. candidates from Parliament.

In 1939 P. still hoped for peaceful relations with Germany. It was known that Hitler regarded Danzig (now Gdansk) and also the corridor to the sea as part of the Ger. *Lebensraum* (q.v.), but it did not seem that Germany was prepared to go to war for them. However, the situation changed after the Ger. annexation of Bohemia in Mar. 1939. Germany began to mass troops, and P. was given a guarantee by Britain and France. The Polish foreign minister, Beck, negotiated an Anglo-Polish pact of mutual assistance, and Hitler annulled the pact of 1934. P. concluded a trade agreement with Russia, though she showed no eagerness to have that country as an ally. On 29 Aug. Hitler sent an ultimatum to P. and read out to the Brit. ambus. in Berlin a number of demands for acceptance by P. before midnight of 31 Aug.; but the demands were never communicated to P. On 1 Sept. Ger. troops crossed the Polish frontier. P. was quite unprepared, and no general mobilisation had been ordered. Of 2,000,000 first-line troops only one-third were in the field. Against the Ger. mechanised divs. P. could put only cavalry. The passes over the Carpathians were unfortified; the country was full of spies.

P. mistakenly tried to defend her strategically indefensible W. border. The long S. border was protected by only 2 infantry divs. The Russian frontier was covered by a weak frontier guard corps. The Polish Air Force possessed only a few first-line aircraft. Germany concentrated 54 front-line divs. against P.'s 22 infantry divs. and 7 cavalry brigades. On 3 Sept. Britain and France declared war on Germany, but it was clear that they could render no direct military assistance to P. Ger. forces overran Pomerania, Poznan, and Silesia, took Cracow, and, crossing the Polish corridor, seized Gdynia. By 12 Sept. Germany had conquered nearly all W. P. After a severe defeat at Kutno Polish forces retired on the line of the Rs. Vistula, San, and Narew, a good strategic position. But the gov. added to the confusion by leaving Warsaw, and a haphazard evacuation of the cap. began which resulted in a congestion of the roads and railways. On 17 Sept. Russian troops, violating the non-aggression pact, crossed the E. frontier. Attacked from the rear, the defence of P. finally collapsed. By 20 Sept. the war was over, except around Warsaw, which stood a siege. Ger. bombers first appeared over Warsaw on 1 Sept., but a concentrated attack by sev. squadrons of the *Luftwaffe* did not begin until some days later. There was practically no defence, as P. possessed only about a hundred anti-aircraft guns, and these were defending military positions. On 20 Sept. the Germans demanded Warsaw's unconditional surrender. This was rejected, and fierce fighting occurred around the city. On 23 Sept. water and electricity supplies broke down. The next day Nazi bombers, fly-

ing in close formations, came over the cap. and began a ruthless and concentrated bombardment lasting from 8 a.m. to 10 p.m., in which the residential quarters were systematically obliterated. On 22 Sept. Germany and Russia partitioned P. by agreement, Germany occupying 72,000 sq. m. in the W. and Russia 78,000 sq. m. in the E., with pops. of over 20,000,000 and 15,000,000 respectively. Vilna was added to Lithuania. Germany incorporated about 34,000 sq. m. of Polish ter. in the Ger. Reich. This included the W. provs. of Pomerania, Poznan, and Śląsk, and large parts of the provs. of Białystok, Cracow, Łódź, and Warsaw. A reign of terror, aiming at extermination, then began. The Poles were driven out of whole cities, which were repopulated by Germans brought from the Baltic states, Czechoslovakia, and Germany. Much property was confiscated. Any opposition by the Poles was answered by reprisals involving, frequently, mass-killings. Jews from Germany, Austria, and Czechoslovakia were deported to a 'Jewish reservation' in Lublin prov., covering 9000 sq. m. and already inhabited by about 2,500,000 Poles, who had to find room for the Jews. Russia in annexing E. Poland gave some semblance of legality in her action by holding plebiscites. The results showed an apparently unanimous vote in favour of annexation.

Guerrilla warfare continued in various places until the end of the war. Mosciecki, the president, resigned, and nominated Rackiewicz, Speaker of the Polish Diet, as his successor. The latter dismissed Smigły-Rydz for incompetence. Gen. Sikorski (q.v.) became Premier and commander of the Polish forces, which were to be reorganised in London and Paris. About 10,000 Polish officers escaped to rejoin the forces in France, and most of the Polish mercantile marine also escaped. In addition, P. saved all her gold reserve, amounting to approximately £25m.

At the end of 1940 Ger. colonists in P. numbered about 350,000. Over 1,000,000 Poles had been deported from the annexed area. Germany now began to exploit P. systematically. Having sequestered Polish property, the Ger. Gov. instituted an organisation of trustees (*Treuhänder*) with head offices in Berlin. Whole streets and even peasant holdings were confiscated; 500,000 Poles were sent forcibly to Germany as agric. labourers, and 100,000 were sent into Ger. factories. Intellectuals were arrested; 8000 univ. profs., schoolmasters, lawyers, and other professional men were put in prison. The contents of Warsaw Univ. library were burned. All Polish manuals of the Polish language and literature, hist., and religion were destroyed, to prevent the private continuation of these studies. Ger. policy aimed at the rapid assimilation in the Reich of the incorporated area in both legislation and administration.

The Central Gov. was an area of 40,000 sq. m. extending to the Rs. Bug and San which was subject to a Ger. governor-

general at Cracow. All Poles driven out of the annexed ter. were forced into this area, regardless of its capacity to absorb them. Most Polish goods were exported to the Reich. Russian P. was also divided into 2 parts, the SE. provs. of Stanisławów, Lwów, Volhynia, and Tarnopol being incorporated in the Ukraine and the NE. provs. of Białystok, Polesia, and Nowogródek in White Russia. Administration was nominally autonomous, but all important measures were enacted by the Moscow Gov. Russian methods in P. have been condemned as being almost as inhumane as those of the Nazis, if less sanguinary.

Throughout 1941 the central gov. remained a kind of colony where the Nazis experimented with methods designed to enforce the Ger. 'New Order' (q.v.). To further the policy of suppression of the educated classes and the reduction of P. to a reservoir of slave labour the W. provs. suffered even more than the Central Gov. in 1941. By the end of the year nearly 100,000 Poles had been murdered and 150,000 were in concentration camps.

In the course of the campaign against Russia, begun on 22 June, 1941, the Germans drove the Russians out of the E. provs. of P., but the Russians had previously deported over 1,500,000 of the inhab. so that the country now occupied by the Germans was in a state of extreme destitution. The Germans incorporated the SE. provs. in the Central Gov. and the N. provs., including Vilna, into an administrative unit called Ostland. The Poles abroad, however, continued to resist. A new Polish Army was organised in Russia, numbering 150,000 men. Sikorski followed a policy of collaboration with Russia and resumed diplomatic relations in 1941. According to official Polish figures, some 200,000 Poles had fallen victim to Nazi executions or were in concentration camps by the end of 1942. But poverty, hunger, and exposure to cold caused the deaths of at least 1,500,000 more. To combat guerilla resistance in the forests around Lublin, the Germans organised mass deportations of Poles from this area in 1942, and there were widespread executions in the Warsaw and Upper Silesia regions. Ger. reverses that year on the E. front made it necessary also to organise a defence in depth in E. Poland against the Soviet forces. The Polish Jews were the victims of the most extreme brutality. Polish official figures give the figure of Jews killed in P. as over 1,000,000.

Polish resistance remained strong, both inside the country and abroad. Part of the Polish Army organised in Russia was sent to the Middle E. under Gen. Anders, and fought in the Libya campaigns. The Polish Army in Britain took part in the allied invasion of Europe, and another army, formed in Russia, fought alongside the Red Army, taking part in the liberation of Warsaw. On 23 June 1944, almost on the third anniversary of the Ger. attack on Russia, the Red Army broke the Ger. front in White Russia on both sides of Vitebsk, and soon afterwards, with the

fall of Mogilev, Minsk, and Polotsk, the Ger. front over a width of 200 m. had ceased to exist. The fall of Polotsk, freeing the way to Dvinsk, was quickly followed by the capture of Molodetchno, pointing the way to Vilna. The Russian armies surged towards Lithuania and S. Latvia and, at the other end of the line, extended their advance to the S. of the Pripiet marshes and occupied Kovel, on one of the routes to Warsaw. Vilna, with 5000 prisoners, fell on 13 July, Pinsk on the 14th, Grodno on the 16th. Lublin and Siedlce fell on 24 July, Deblin, on the Vistula, on the 26th; Lwów, Białystok, Stanisławów, Przemyśl, Yaroslavl, and Brest-Litovsk on 27-28 July. Early in Aug., however, the Red Army halted in front of Warsaw. Inside the city, the Polish resistance movement had organised a great insurrection in support of the advancing Soviet armies, only to be tragically disillusioned; and after weeks of desperate fighting the Warsaw resistance collapsed. The Russian offensive was renewed in the late autumn. Radom, Warsaw, Łódź, and Cracow were all taken by the victorious armies of Zhukov and Konev by 19 Jan., 1945. Toruń was reduced on 1 Feb., but Poznań was not captured until 23 Feb., when at length the Red Army was in possession of the whole of P. See further under EASTERN FRONT or RUSSO-GERMAN CAMPAIGNS IN THE SECOND WORLD WAR.

On 21 April, 1945 a 20-year treaty of 'friendship, mutual assistance, and post-war co-operation' between the Soviet Union and P. was signed in Moscow by Stalin and Osóbka-Morawski, Polish Premier in the Polish provisional gov., then at Lublin. The period immediately following the termination of hostilities was one of mounting political and social disorder in P., arising from the fact that the social structure of the country had been completely shattered and that the essential task confronting all Poles was to rebuild their whole economy. Confusion was enhanced by the forced immigrations E. and W. of large elements of the Polish and Ger. pops., displaced to conform the new delimitations of the Polish frontiers. These theoretically remain (1957) to be settled finally by a future peace treaty with Germany, but, meanwhile, at the Potsdam conference (July-Aug. 1945) the 3 powers agreed that some changes should be made to compensate for terr. occupied by Russia E. of the Curzon line, and the decisions reached then have since been recognised as permanent by the Soviet bloc, including the Ger. Democratic Republic in E. Germany. P. received part of the Ger. E. provs. to the extent of over 40,000 sq. m., and into this region the Polish pop. of the provs. ceded to Russia migrated. The minority problem in P. thus disappeared after the Second World War. The Jews had been almost exterminated, the Russians absorbed into the Soviet Union, and the Germans expelled beyond the Oder. Facing the great tasks of reconstruction in 1946 was an inexperienced administration headed by

the 'Polish Provisional Gov. of National Unity.' The 2 groups which had joined during the Moscow negotiations to form this gov. remained distinct and independent. On the one hand there was the original 'Lublin' group, the actual regime, in which the Communist Polish Workers' party (*Polska Partia Robotnicza*) was dominant, in association with the Peasant party and the Democratic party. On the other hand, there was Mikołajczyk's Polish Peasant party. Besides the support of his own party, Mikołajczyk had the goodwill of sev. mixed elements, who adopted a negative attitude to the regime. The Polish Socialist party was non-belligerent rather than neutral, as it leaned heavily towards the Lublin group. Mikołajczyk's position was difficult; he was the leader of the opposition who had joined the cabinet for a common purpose pending the general elections. The most important factor in the regime was the Polish Workers' party, which held most of the key positions in administration and economic affairs, and which could rely if necessary on the support of the large numbers of Russian troops stationed in P. But the political situation could be clarified only by a general election, and the first election was not held until the beginning of 1947. Meanwhile foreign policy was strictly assimilated to that of Russia, and the Warsaw Gov. was scrupulous to avoid displeasing its great E. neighbour. Ultimately, when the elections were held, the 'democratic bloc' (mainly Workers' party) of pro-Russians obtained an overwhelming majority and the Peasant party of Mikołajczyk and other parties virtually disappeared. Mikołajczyk fled from P. The Polish Gov. of 1947 was not democratic in the W. sense, nor was the election of 1947 conducted on W. principles; but it should be remembered that W. democracy had been given little chance to become estab. in pre-1939 P. The Polish Communists gave the appearance at first of pursuing an independent policy; it was not until they were well estab. in 1948 and 1949, that their close ties with and dependence on the Soviet Union became obvious. In any case, Polish hatred and fear of Germany had tended to lessen the traditional Polish enmity with Russia.

By 1948 P. presented a remarkable picture of post-war recovery to the outside world. After the war Warsaw was a heap of rubble; Gdańsk, Poznań, and Wrocław were also in ruins. But by 1948 the rebuilding of Warsaw was well advanced. The banditry which was prevalent all over P. immediately after the War had been suppressed. P.'s rapid recovery owed much to the considerable industrial facilities which she acquired in Śląsk and Pomerania, though these facilities had in many cases suffered severe damage during the War. Other factors in the Polish recovery were the vigour of the gov. and the generous relief given by U.N.R.R.A.

In Dec. 1948 the Socialists merged with the Communists and the Polish United Workers' party was formed. This en-

joyed almost complete immunity from parl. opposition, since the other 4 parties also joined the gov. bloc. An extensive party purge, carried out at all levels throughout the country, and directed at elements opposed to a Marxist-Leninist state, removed from office Gomulka (q.v.), one of the leading Communists, who was popularly considered a national rather than a party leader.



Polish Embassy

CRACOW: THE GOTHIC WAWEL CATHEDRAL. The Renaissance Sigismund and Vasa Chapels (sixteenth and seventeenth century) are seen on the right.

After this P. began to mirror Soviet policy in every detail. She withdrew from the various international organisations which had links with the W.: from the International Monetary Fund in 1950, and from U.N.E.S.C.O. in 1952. The new constitution of 1952 modelled the regime more closely on the Soviet pattern, and the elections of Nov. 1952 were conducted on the Soviet model of a single list of gov. sponsored 'National Front' candidates. There was increasing friction between the gov. and the Catholic Church, the one force in P. still offering resistance to Soviet penetration. In Oct. 1953 Cardinal Wyszyński (q.v.) was placed under arrest and confined to a monastery.

The appointment of Rokossovsky (q.v.), the Polish-born Russian soldier, as Polish minister of national defence in 1949, made

it clear that the links between Russia and P. were henceforth to be extremely close. Large contingents of Russian troops remained in P. Reports reaching the W. now placed less emphasis on P.'s magnificent reconstruction achievements, and stressed increasingly the discontent general throughout the country owing to the scarcity of basic consumer goods, the harsh labour conditions, and the rigorous administration. Even official gov. sources occasionally indicated that the economic state of the country was extremely precarious.

In June 1956 serious rioting broke out in Poznań. This was crushed; but it was soon clear that an anti-Russian reaction had set in even among confirmed Polish Communists. In Oct. Gomułka was elected first secretary of the central committee of the United Workers' party, thus becoming effective ruler of P. At the same time, Rokossovsky was dropped from the Politburo; he subsequently left P., and in Dec. formally resigned his posts of Polish commander-in-chief and minister of defence. Gomułka's position was precarious; but the elections in Jan. 1957, in which he received the support of the Church (Cardinal Wyszyński had now been freed and reinstated) confirmed that he enjoyed wide popularity. Russian troops remained in P., but the gov., although controlled by Polish communists, was now considerably more liberal in character. Religious instruction was again being permitted in Polish schools; and contacts with W. Europe were being fostered.

Language and Literature. The Polish language uses the Lat. alphabet, modified by diacritical marks, and is structurally similar to the other Slavonic languages, to the W. group of which it belongs. Among the features of Polish, are a fixed accent (on the penultimate syllable of the word), the presence of the nasal vowels *a* and *ę* (similar to Fr. *on* and *in*), and the use of the third person singular for the polite form of address. The sound of Polish is characterised by the large number of sibilant consonants, while sev. different consonants can stand together, even at the beginning of a word (e.g. *śdźbło*, stem; *chrzcić*, baptist).

Most early Polish literature was written in Latin, and only a few glosses precede the song *Bogurodzica* (13th cent.), the oldest original Polish work surviving. From the 13th to the 16th cents. only some sermons and a psalter (*Psalterz florjański*) are of note, but the second half of the 16th cent. was the golden age of Polish literature. The most notable productions of this Polish Renaissance are the prose works of Mikołaj Rej, the lyric poems of Jan Kochanowski (written first in Latin and later in Polish), the *Dworzanie* of Gornicki, based on Castiglione's *Cortegiano*, and Wujek's trans. of the Bible. In the 17th cent. the historical epics of Twardowski and Potocki, and the lyric verse and poetic trans. of A. Morsztyn are notable. The 18th cent. was the

Age of Enlightenment, and the most important figure is Archbishop Ignacy Krasicki, author of satirical verses, novels, etc. This century also saw the beginnings of the Polish theatre. The Romantic movement arrived in Poland about the 1820s, when the country was deprived of political independence, so that many of the outstanding writers of this time were forced to live and write abroad. These included Adam Mickiewicz (q.v.), the greatest Polish poet, and the only one who has become known internationally. Second only to Mickiewicz, is Juliusz Słowacki (q.v.), writer of lyric verse and poetic dramas. The third great Romantic figure is the philosophical poet Z. Krasiński. Other writers of the first half of the 19th cent. were the dramatist Fredro, Korzeniowski (comedies, novels), and Kraszewski (novels). The defeat of the 1863 rebellion was the death of Romanticism. The 'positivist' writers dealt with social and moral problems in a realistic way. Sienkiewicz (q.v.), the greatest Polish novelist, was a positivist at first, but later turned to historical themes (*Quo Vadis?*). Other great realist writers are B. Prus, W. Reymont, and 2 women writers, E. Orzeszkowa, and G. Zapolska (q.v.). During the period c. 1890-1914 poets turned to symbolism, while prose writers include S. Żeromski (historical and social novels), and the dramatist S. Wyspiański, whose greatest play was *The Wedding*. Between 1918 and 1939, in a Poland again politically independent, literature flourished. Lyric poetry was particularly noteworthy (e.g. in the 'Skamander' group, with J. Tuwim and others). Since 1945 a large number of new writers have emerged, including J. Iwaszkiewicz, J. Putrament, A. Rudnicki, and J. Andrzejewski (prose writers), and J. Przybóś (verse).

Art. The arts in P., while they have been subject to many external influences, especially those of W. Europe, have a vigorous national element. The rich and colourful interior of the Gothic church of St Mary in Cracov has been cited as an early example and contrasted with the more austere Gothic of Chartres or Notre Dame. Byzantine influence on church painting in the Middle Ages was strong (e.g. the famous Our Lady of Częstochowa) and left a lasting impression on 'folk' art. From the 16th cent. onwards, when P. became the 'granary of Europe', the enriched clergy and the nobility had resort to W. styles in their churches, palaces, and country mansions and the paintings that embellished them. P. had baroque and classical periods, owing something to Germany; in the 18th cent. foreign painters were much patronised, the Venetian Bernardo Bellotto producing interesting views of Warsaw, while the Frenchman Jean Pierre Norblin painted Polish scenes somewhat in the style of Watteau. In the 19th cent., when P. lost her independence, art became imbued with nationalistic fervour, reflected in the war-like scenes of Piotr Michałowski (1800-65), the historical compositions of

Jan Matejko (1838-93), and the genre pictures of Polish life by Jan Chelmonski (1850-1914). Another tendency, without this patriotic message, was sympathetic with Fr. Impressionism. The 'Young Poland' movement inspired a group at Cracow, called *Sztuka* ('Art'), delighting in colour. Representative of this phase (mainly landscape and still-life painting) are Stanisław Wyspiański (1869-1907), Leon Wyczolkowski (1852-1937), and Jan Stanisławski (1861-1907). In the present cent. P. has had her *avant-garde* of painters. A post-impressionist current is represented by the pictures of Zygmunt Waliszewski and Jan Cybis, while the 'formist' movement has led towards abstraction and experiment. The destruction caused by the Second World War, and the industrial revolution following it, have aroused enthusiasm for new forms and ideas in architecture, town-planning, and various forms of design, abstract art being for an artist like Tadeusz Kantor a social force. In the cultivation of new ideas in art, P. as a proletarian state differs from her neighbour Soviet Russia.

Folk art (the old 'peasant art') has not been discarded. Its gaily decorated ceramics and textiles, its decorative and 'primitive' painting and sculpture, have been a distinctive feature of Polish culture, and it is to-day encouraged by the Ministry of Culture and Art and linked with the present-day developments in industrial and decorative art. P. has notable modern sculptors in Dunikowski and Wittig, and has produced excellent graphic artists. Daniel Chodowiecki (1726-1801) is well known; Władysław Skoczylas (1883-1934) is noted for woodcuts adapting folk motifs; and Henryk Tomaszewski is a talented present-day illustrator and poster-designer. Among Polish artists of our time who have worked or are working in Britain are the late Jankel Adler, Henryk Gotlib, Stefan Knapp, Josef Herman, and Feliks Topolski, while others, like Willy Mucha, have worked in France and in the spirit of the School of Paris.

Music. Polish church music was particularly fine during the 14th and 15th cents. In the 16th cent. Cracow was a centre of music in central Europe. When the nationalist movement began in the 18th cent. Polish composers began to incorporate the national songs and dances in their compositions. The *Krakowiak*, the *Kujawiak*, and the *Mazurka* are dances deriving their names from various dists.; those of the later *Polka* and *Polonaise* (qq.v.) show their Polish origin. K. Kurpiński (1785-1857), M. Kamiński (1734-1821), and J. Elsner (1769-1854) were the earliest composers to use the national music as a basis for their compositions; Elsner was Chopin's teacher, and it was Chopin (q.v.) who perfected the blending of national music and that which had international traditions. Moniuszko (1819-72) estab. a national opera and Karol Szymanowski (1882-1937) was P.'s leading modern composer.

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Polar Axis, axis of an astronomical instrument or an equatorial, which is parallel to the earth's axis. The term is used in connection with the mounting of a telescope; in the equatorial form of mounting the telescope can rotate about 2 axes; one, the P. A., directed towards the celestial pole and the other, the declination axis, at right angles thereto, in the plane of the celestial equator.

In mineralogy P. A. denotes a crystallographic axis with different arrangement of faces at the two ends of the crystal. Its presence may also be detected by the development of positive and negative terminal charges when the crystal is heated or cooled uniformly (pyro-electric effect). Examples of minerals with a P. A. and which reveal true pyro-electricity are tourmaline, blende, and diopside.

Polar Bear, see BEAR.

Polar Exploration, see ANTARCTIC EXPLORATION; ARCTIC EXPLORATION.

Polar Front, term used in meteorology to describe a surface of discontinuity between polar and tropical air. The term was invented by the Norwegian meteorologists, V. and J. Bjerknes.

Polar Light, see LIGHTS, NORTHERN.

Polar Regions, see ARCTIC OCEAN; ANTARCTIC OCEAN.

Polaris, pole-star; α Ursae Minoris, magnitude 2.1, situated (1955) about 56'

from the pole. There is a companion star 18" away and of the 9th magnitude, and an invisible attendant inferred from spectrographic observations round which P. revolves in 4 days. Distance of P. about 50 light-years; candle-power about 30 times that of the sun. About 3000 BC α Draconis was not more than 10' from the N. pole; while 12,000 years hence α Lyrae will be within 5° of it.

Polarisation, Electrolytic, *see* ELECTROLYSIS THEORY OF VOLTAGE CELL, and CELL, VOLTALIC.

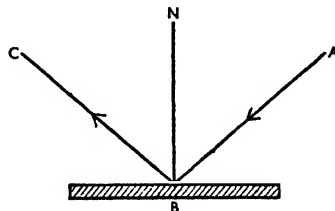
Polarisation, Elliptic, *see* ELLIPTIC.

Polarisation Microscope, instrument in which objects are viewed microscopically by polarised light (*see* POLARISATION OF LIGHT). The P. M. is extensively used in geology and mineralogy, and to an increasing degree in metallurgy, biology, and chem.; it greatly assists in the identification of minute particles of crystals, minerals, biological tissues, etc.

Polarisation of Light. Light consists of associated periodic variations of electric and magnetic fields, i.e. electromagnetic waves (q.v.). The variations or vibrations take place in all planes perpendicular to the direction of propagation of the light. When ordinary light is transmitted perpendicularly through a plate cut from a crystal of tourmaline in a particular direction (parallel to the prin. axis) the emerging light possesses a certain peculiarity in that if it is incident on another similar plate of tourmaline, the axis of which is at right angles to that of the first plate, no light is transmitted. If the two axial directions are parallel, light is transmitted. In intermediate positions some light passes through the second plate. In this way the apparently paradoxical result is obtained whereby the placing together of two transparent bodies produces an opaque body. This leads to the conclusion that light waves consist of vibrations, transverse to the line of propagation. When the light has passed through the first plate, these vibrations are limited to one plane perpendicular to the direction of the ray, and then the light is said to be plane polarised. The second plate is only capable of letting through light corresponding to vibrations in one particular plane. Thus if the axial directions in the first and second plates are parallel to each other light can emerge. If they are completely crossed, i.e. inclined at 90°, there are no vibrations which the second plate can allow to pass. In intermediate positions there will be a 'resolved part' parallel to the direction in which the second plate allows light to emerge. Clearly, polarised light may be detected by interposing a crystal of tourmaline in the path of the light and by rotating the crystal about the path as axis. If the light becomes duller by the rotation the light is partially polarised, whereas if no effect is produced, the light is not polarised. An exception to this occurs when the light is *circularly polarised*. Such light presents the same 'resolved part' of its vibrations at all angles in a plane perpendicular to its direction of propagation.

It consists of 2 components polarised at right angles, of equal intensity, but with their wave trains out of step (i.e. out of phase) by one-quarter of a full vibration cycle. It can be distinguished from unpolarised light by passing it through a special plate which slows up one component relative to the other so that the resolved part ceases to be the same at all angles. Subsequent examination with a tourmaline crystal then detects a variation of intensity on rotation if the original light was circularly or plane polarised, but no effect for unpolarised light.

Polarisation by reflection may be noticed by observing light reflected from the surface of water or glass by means of a



POLARISATION OF LIGHT

tourmaline crystal. The brightness of the transmitted light will vary as the crystal is rotated. When light is reflected from a plane surface, the incident ray AB, the normal BN, and the reflected ray BC all lie in the same plane, called the plane of incidence, and the angle which the incident ray AB makes with BN, i.e. ABN, is called the angle of incidence. The vibrations of an incident ray take place in all planes perpendicular to its direction. Thus in the above diagram some of these vibrations are in the plane of incidence, i.e. the plane of the paper, while others are perpendicular to it. It is found that at a certain angle of incidence all vibrations in the plane of incidence are transmitted, while only those perpendicular to this plane are reflected. The particular angle of incidence at which this takes place is called the angle of polarisation or Brewster's angle, and according to Brewster's law $\tan \theta = \mu$, where θ is the angle of polarisation and μ the refractive index of the reflecting medium. Polarisation is also exhibited in the phenomena of double refraction (q.v.).

The most important instrument in this connection is the Nicol prism, which is made of Iceland spar. A crystal of Iceland spar is cut perpendicular to its prin. section and divided into 2 parts, which are then cemented together by a film of Canada balsam. A ray incident on the prism gives rise to 2 refracted rays, the ordinary ray being totally reflected out of the prism by the balsam, while the extraordinary ray is transmitted. Thus the ray transmitted is one which is polar-

ised. In the Polarimeter one Nicol prism is used as the 'polariser' to produce the polarised light, and the other as the 'analyser' to examine it. Another peculiar result is that when polarised light is transmitted by a crystal of quartz, the plane of polarisation is found to be rotated through a definite angle. Many organic and some inorganic substances exhibit this property either by themselves or in solution rotating the plane to the right or left. Those which rotate the plane to the right are called dextrorotatory, and those to the left laevorotatory. This forms a basis of estimating the percentage strength of such a solution, the amount of rotation being proportional to the quantity of substance present in the solution. The phenomenon of double refraction and resulting polarisation occurs in many other crystals besides Iceland spar. It can also be caused to a relatively small extent in various liquids (e.g. nitrobenzene) by the application of strong electric or magnetic fields. See also LIGHT; OPTICS; POLAROID.

Polarity of a body is the tendency which some bodies possess to set in a definite direction when acted upon by an external force. This direction is often called the direction of the mathematical axis of the body. The property may be natural or it may be induced by external agencies. Thus a piece of lodestone tends to set in a definite direction, as also does an artificial magnet. In these and similar bodies, it also denotes the existence of 2 points possessing properties quite opposed to one another. Various other instances may be found in the study of electrostatics and current electricity (qq.v.).

Polaroid, a manufactured substance which absorbs all light except that vibrating in a certain direction, i.e. the transmitted light is plane polarised in that direction. Thus it has the same effect as a Nicol prism (see POLARISATION OF LIGHT), but acts on a different principle. P. consists of artificially prepared crystals of herapathite, iodosulphate of quinine, all oriented in the same direction on a glass plate or in a celluloid film. P. filters are used by photographers and motorists to avoid troublesome reflections, most of which give partially polarised light. Such light will not pass through a P. if its orientation is correctly chosen.

Polozyn Zdrój (Ger. Polzin), tn of Poland, in Koszalin prov., 28 m. S. of Koszalin (q.v.). Until 1945 it was in Pomerania (q.v.). It is a spa and a railway junction, and has a brewing industry. Pop. 4000.

Polden, T. Ernest (1859-1916), co-founder of the firm of Gale & Polden, b. Chatham, the son of an Army schoolmaster. This led to the shaping of the company in its specialist sphere of naval and military printing and publishing. He entered into partnership with James Gale, also of Chatham, in the 1870's. Under E. P.'s direction the company estab. the Brompton Works at Chatham, the head office in London, a branch at

Portsmouth, and in 1893 the Wellington Press at Aldershot. In 1894 he founded the *Aldershot News*, the forerunner of the Hants and NW. Surrey group of newspapers. In this work he was assisted by his brother E. Russell P. (1865-1955).

Polder, name given in the Netherlands to the low-lying, marshy coastal regions, which from the 17th cent. onward, by dint of unremitting toil, have slowly been reclaimed from the sea and converted into arable or pasture land. Most of the P. windmills, which were a traditional feature of the landscape, have now been replaced by electric or diesel pumping stations. See also BEEMSTER; HAARLEM LAKE; IJSELMEER; NORTH-EAST POLDER; WIERINGEN; ZUIDER ZEE.



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CONSTRUCTING A POLDER DYKE

Pole, de la, illustrious family in Eng. hist.

William de la P. (d. 1366), sometimes called *William atte Pool*, merchant of Hull, who advanced loans to Edward III.

Michael de la P. (?1330-89), 1st Earl of Suffolk, son of the above. As chancellor of England and trusted adviser to Richard II he aroused the jealousy of Lords and Commons, and in 1387 was obliged to seek refuge in Paris, where he

later *d.*, both his estates and life being declared forfeit.

William de la P. (1396-1450), 4th Earl and first Duke of Suffolk, negotiated Henry VI's marriage with Margaret of Anjou, and took a leading part in bringing about the disgrace of Humphrey, Duke of Gloucester. He was accused by the Commons of having 'sold the realm to France,' and banished from the kingdom. His ship was intercepted off Dover and he was murdered, possibly by order of the Duke of York.

John de la P. (1146-87), Earl of Lincoln, a loyal supporter of Richard III, whom he was ambitious to succeed. His mother was a sister of Edward IV. The leader of Lambert Simnel's conspiracy, he *d.* at the battle of Stoke.

Sir Edmund de la P. (1472-1513), Earl of Suffolk, brother to the above. A descendant of Edward IV, he was executed by Henry VIII because of his dangerous nearness to the throne.

Richard de la P. (*d.* 1525), brother of the above. He aspired to the Eng. throne, and was recognised as King of England by Louis XII, 1512, but *d.* at Pavia, where he fought for Francis I.

Pole, Matthew, see POOLE.

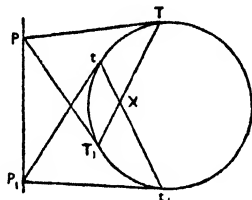
Pole, Reginald (1500-58), Eng. cardinal and Archbishop of Canterbury, *b.* Stourton Castle, Staffs, son of Sir Richard P. and Margaret, countess of Salisbury, and educ. at Magdalen College, Oxford, later studying abroad until 1527. On his return he was given the deanery of Exeter, and might at once have secured high preferment if he had expressed his approval of Henry VIII's divorce. P., however, retired abroad. In 1536 he wrote *Pro Ecclesiasticæ Unitatis Defensione*, in which he formulated his views on eccles. affairs, with special reference to Henry VIII's conduct; and in the same year the Pope made him a cardinal. In 1540 he was one of the three legates appointed to open the Council of Trent. P. was one of a number of prominent churchmen who worked hard to effect a reconciliation with the Protestant theologians, and was at one time suspected of heresy. He came again to England in 1554 as papal legate, and 2 years later was appointed Archbishop of Canterbury. He died at Lambeth Palace on 17 Nov. It was the main object of his life to counteract the Reformation in England, and he is generally considered primarily responsible for the deaths of large numbers of Protestants in Mary's reign. See lives by J. Halle, 1910, and F. A. Gasquet, 1927.

Pole = 5.5 yds = 16.5 ft = 198 in. This unit is now little used in linear measurements, but has special interest on account of its seeming antiquity, for it can be equated to 10 Sumerian cubits. See METROLOGY. See also A. E. Berriman, *Historical Metrology*, 1953.

Pole and Polar. The polar of a point P outside a circle (or any conic) is the line TT₁ joining the points of contact, T and T₁, of the two tangents drawn from P to the circle; P is called the pole of its polar

TT₁. If P is on the circle its polar is the single tangent at P.

The polar of a point X inside the circle is the line PP₁ joining the poles P and P₁ of any 2 chords TT₁ and t₁ through X; X is the pole of the line PP₁.



Pole-star, see POLARIS.

Pole-star Recorder, instrument invented by E. C. Pickering, consisting of a telescope camera. The pole-star, which describes a small circle every 24 hours, owing to its distance of 56' (in 1955) from the pole, is photographed, and from its trace on the photographic plate the amount of cloudiness of the atmosphere at night is estimated. See STARSHINE CAMERA or NIGHT-SKY RECORDER.

Polecats (*Putorius putorius*) carnivore belonging to the weasel family, Mustelidae. The Lat. adjective *putorius*, derived from *puere*, refers to its fetid smell, which probably accounts for its never being tamed. The common European variety is 18 in. long, 5 in. being tall. White markings occur on the face, with its short ears and pointed nose, but otherwise its fur is dark brown above and black below. Its skin is called 'fitch' and makes excellent artists' brushes, but poor fur. The P. preys on poultry yards, and for that reason has been almost exterminated in the Brit. Isles. It lives also on mice, rats, rabbits, eggs, frogs, and pigeons. In winter it frequents deserted barns; in summer it prowls in the open or goes down rabbit warrens or fox-holes. Its young (from 3 to 8 at a time) are born in the spring. Many regard the ferret as a domesticated P.

Polemio, or Polemon: 1. (c. 351-273 BC), Gk philosopher, *b.* Athens. He was said to have been converted from a profligate's life by a discourse on temperance by Xenocrates (q.v.), whom he succeeded as head of the Academy.

2. Son of the rhetorician Zeno, was appointed in 39 BC to the gov. of a part of Cilicia by Mark Antony, and subsequently obtained in exchange the kingdom of Pontus. Although he opposed Augustus at Actium, he afterwards profited by that emperor's clemency, and was made King of Bosphorus after conquering that country. He was succeeded by his wife Pythodoris.

3. A sophist of Laodicea in Asia Minor, taught rhetoric at Smyrna, and won the respect both of Hadrian and Antoninus Pius. His most famous disciple was Aristides.

4. Author of 2 books on physiognomy, was probably a Christian, and lived before Origen (d. AD 254). He describes the features and characteristics of the impudent and the talkative man, etc.

Poles, ends of the earth's rotational axis. The P. are known to be subject to slight variations; one is due mainly to meteorological causes and involves a movement of about 18 ft with a period of a year; another is a movement of about 36 ft with a period of 428 days. This latter is due to the fact that the earth is not a perfectly rigid body. The other movements, considerably greater, are of a different nature, and are due to precession (q.v.) and nutation (q.v.). The celestial P. are the 2 points on the celestial sphere where it is intersected by the prolongation of the earth's axis. See also ARCTIC; ANTARCTIC.

Polesden Lacey, mansion situated near Leatherhead, Surrey, England, bequeathed in 1942 to the National Trust, standing in a beautiful setting crowning a ridge of the N. Downs. In early documents P. L. appears as Polesden or Pouldsdown, the suffix Lacey being added in the late 18th cent. Originally a Caroline house of 1632 owned by Richard Brinsley Sheridan stood on the site. Sheridan bought the property in 1797 as part of the marriage settlement of his second wife, Elizabeth Ogle; he found the house in a dilapidated state and in fact called it a 'ruin,' but his ambitious plans for rebuilding came to nothing. The only visible trace of his ownership to-day is the long terraced walk, which he greatly extended. In 1824 there was built on the site of Sheridan's demolished house a Regency villa, built to the design of Thomas Cubitt, in the neo-Grecian style, with an elegant Ionic colonnade on the S. front. Though the interior was completely altered in 1906, the exterior preserves something of the aspect of a villa of the Regency period, and the main front facing S. with its Ionic colonnade remains much as when first erected.

Polesine, see ROVIGO.

Polesworth, coal-mining vil., on the Anker, between Tamworth and Atherstone in Warwickshire, England. The church is partly Norman. Pop. 4000.

Poles'ye: 1. Swampy lowland area in W. Russia, comprising the Pripet basin and the adjacent portion of the Dnieper lowland in the E., c. 60,000 sq. m., partly covered with pine and oak forests. The area has large salt, potash, and peat deposits. There is lumbering and some agriculture.

2. Former Oblast in S. Belorussia (1938-54), with Mozyr' as cap. It is now included in Gomel' Oblast.

Pollanthes, monotypic genus of a bulbous plant (family Amaryllidaceae). *P. tuberosa*, the tuberose, a native of Mexico, bears fragrant white flowers in autumn and winter. Sev. varieties have been raised, including the double African, the tubers of which should be potted in the autumn, and the Amer. or pearl varieties, which are potted from Jan. to April.

Police. Some kind of compulsion has always been necessary in the most primitive communities for securing effective observance of law and order. The P. force, though the term is one of recent origin, probably originated in primitive Asiatic tribal customs, and evolved through those of central European tribes into one of its most developed historical forms, the tithing system of A.-S. England, in which the community was organised into groups each of 10 families, who were collectively responsible for the observance of laws by each group member. The group representative was called the tithingman, and from him the evolution of the modern Brit. and Amer. policeman can be traced.

In England the tithingman became the unpaid, elected, or appointed par. constable of the 18th cent. The failure of the latter to cope with the changed conditions resulting from the Industrial Revolution gave rise to a period in which, at first in London, and later throughout the country, uncontrollable crime and riots are acknowledged by contemporary writers to have menaced the existence of the State. Provision for a new police force for London was made in the Metropolitan Police Act, 1829, but the structure and detail of the organisation were conceived and planned by the first 2 commissioners, Col. Charles Rowan and Richard Mayne. The New, or Metropolitan, P. became the model for the estab. later of prov. forces. These were the Bor. P. (Municipal Corporations Act, 1835) and the Co. P. (County P. Act, 1839, and County Borough P. Act, 1856). The first thousand of Peel's new P. began their patrol in blue tailcoats and top hats, on 29 Sept. 1829. An Act of 1839 enabled the metropolitan P. dist. to be extended to any par. within a distance of 15 m. (now 16) of Charing Cross. (See also METROPOLITAN POLICE.) The municipal bors. followed suit before many years had passed, and by the middle of the 19th cent. nearly all of them had estab. a paid P. force constituted as nearly as possible on the same footing as that of the metropolis. But even at that time the co. organisation remained archaic and defective, only a few of the quarter sessions courts availing themselves of their statutory powers under the Act of 1839 to institute a P. force for rural dists. The next step forward was taken with the passing of the County and Borough P. Act, 1856, which required the justices to establish a paid P. force throughout each county wherever this had not been done. Under the Local Government Act, 1888, the responsibility of the justices for the administration of the co. P. forces was transferred to a Standing Joint Committee in each co., on which the co. council and the justices were equally represented.

The metropolitan P. are the only exception (apart from the railway P. and similar bodies) to the principle of local control which characterises the Brit. P. organisation and sharply differentiates it from the State-controlled P. of

continental countries. Outside Greater London the P. are administered by a local authority, known as 'the police authority.' While, as indicated above, the co. P. authority is the standing joint committee, in the bors. it is the watch committee of the tn council. The Home Secretary is the P. authority for the Metropolitan P. The prin. officers of the force are appointed by the Crown. State control or nationalisation of the P. forces has often been urged since the passing of the County Police Act, 1839, and that local independence and diversity of control have drawbacks is obvious, particularly as regards the detection of crime. To meet these difficulties the Police Act, 1946, was passed which abolished all but 2 of the non-co. bor. forces and made provision for both voluntary and compulsory schemes of amalgamation in the interests of efficiency. Since 1947 a number of amalgamations have taken place under this Act. By these arrangements many of the obvious defects of small forces have been overcome, and the principle of nationalisation has now lost most of its supporters. Certain services which it would be impracticable for each P. force to provide satisfactorily on its own are organised by the Home Office and P. authorities on a regional basis. These common P. services include training facilities, forensic science laboratories, wireless, and P. promotion examinations.

Under the Special Constables Act of 1831 special constables might be appointed only in the event of tumults and riots. They were employed with success during the Chartist alarm of 1848, the Fenian disturbances of 1868, and the railway strike of 1911, being discharged as soon as the emergency was over. On the outbreak of the First World War power was taken under the Special Constables Act, 1914, to appoint special constables during the war otherwise than in the event of a tumult, riot, or felony, and this was extended to time of peace by the Special Constables Act, 1923. Regulations made under these Acts now provide for the maintenance, by individual P. forces, of a Special Constabulary Reserve on a permanent footing. A special constable is not entitled to any payment for his services, but may be paid an allowance for out-of-pocket expenses or losses of

Generally speaking, the appointment and swearing in of the various ordinary P. constables are vested in the watch committee in cities and boroughs (except the City of London) and the chief officer of P. elsewhere; under the Police Act of 1919 the justices appoint the chief constable, and the latter appoints the petty or ordinary officers, while the home secretary has the power to make rules for the government of the P. The Metropolitan P. are appointed by the Commissioner of P. of the Metropolis. The City of London P. are appointed by the Commissioner of P. for the City of London and controlled by the Common Council of the City.

Recent Reforms. A P. strike in 1918 led to the setting up of the Desborough Committee of Inquiry. In consequence of its report the Police Act of 1919 was passed. This Act empowered the Home Secretary to make regulations having the effect of standardising P. pay and conditions of service throughout the country, and estab. the Police Federation, a representative organisation for officers below the rank of superintendent. The first Police Regulations were made in 1920, and, as now amended, prescribe uniform scales of pay and certain emoluments (e.g. detective duty allowances, plain-clothes allowance, boot allowance), while other allowances, such as rent allowance, bicycle allowances, etc., are left within certain broadly defined limits to the discretion of the individual P. authority. These regulations also specify the right of a police officer to free quarters (or rent allowance) and free uniform (or uniform allowance). This was followed by the Police Pensions Act (1921).

Between 1928 and 1933 the commissioner, Lord Byng, and his successor, Lord Trenchard, reorganised the Metropolitan P. New duties, such as traffic patrol, were provided for without any addition to the strength. The beat system was reorganised into ordinary beats and patrols in touch by wireless and telephone boxes with Scotland Yard; and motor cars, telephones, teleprinters, wireless, and other mechanical aids, as distinguished from the old fixed point boxes, enabled the P. to respond more quickly to calls. Another important feature of Lord Trenchard's reform was the scheme for recruitment to the higher posts, which materialised in the estab. of a P. college at Hendon for outstanding men from the force or young men direct from the univs. and secondary schools. This training scheme was criticised as undemocratic, and after the Second World War it was decided not to reopen the Metropolitan P. College at Hendon, which had been closed at the outbreak of hostilities. A new P. college was opened at Ryton-on-Dunsmore near Coventry in 1948. It trains only serving officers for senior positions in the force.

The need to recruit and retain an adequate number of suitable men and women for the police forces of England and Wales and Scotland after the Second World War presented a serious problem, and in 1948 the gov. accordingly appointed a committee under the chairmanship of Lord Oaksey to consider and to report on P. pay, emoluments, allowances, pensions, promotion, methods of representation and negotiation, and other conditions of service. Their report was issued in 2 separate parts in 1949. The first part recommended substantial improvements in pay and conditions of service, which were introduced by the gov. on 1 July 1949. The second part of the report related to matters of a more intricate nature, requiring more mature consideration. One of the most important recommendations in this part of the report was

the estab. of a negotiating body, and this was brought into effect in 1953, with the estab. of the Police Council for Great Britain. The Council consists of an Official Side (representing the P. authorities) and a Staff Side (representing all ranks of the P.) meeting under an independent chairman appointed by the Prime Minister, with the function of discussing and negotiating (with recourse to independent arbitration in the event of disagreement) matters affecting the general conditions of service of members of the P. forces of England and Wales and Scotland. Agreements of the Council are not self-operating, but require the approval of the secretaries of state, who may, exceptionally, reject an agreement or refer it back to the Council.

The current scales of pay for men officers (prov.) are at present (1957): constable £490 a year on appointment, £550 a year after 2 years of service and rising by ann. increments to a maximum of £660 after 9 years' service; sergeant £695, rising by ann. increments to £755; inspector £825, rising by ann. increments of £30 to £885; chief inspector £935, rising by 2 ann. increments to £1000. Superintendent Class II, Superintendent Class I, and Chief Superintendent after 2 ann. increments of £35 reach maxima of £1190, £1320, and £1430 respectively. The pay of chief constables depends on the size of their force, and varies from £1130 rising in 3 ann. increments to £1290 for chief constables of forces with less than 40 officers to £3485 for chief constables with forces over 2500. In London officers either receive a London allowance in addition to their pay, or usually have a slightly higher rate of pay than that paid to the same rank in prov. forces. Women officers' pay is $\frac{1}{2}$ that for men. Police officers on retirement after 25 years' service receive a pension of half their pay based on their average pay in the last 3 years of service, or after 30 years' service, a two-thirds pension.

Auxiliary Services. The river P., or Thames div. of the Metropolitan force, patrol the Thames from Teddington lock to Dagenham, and are the oldest part of the force, having their origin in the 'marine' P. which were estab. in 1798 to check depredations on shipping in the riv. They were effective in their early days in ending piracy and pillage. Since then their usefulness has lain in preventing crime and in retrieving drowning persons or dead bodies. They work in liaison with the Port of London Authority, and patrol the riv. in motor launches and motor boats. The next oldest branch of the Metropolitan P., the mounted P., had its origin in the Bow Street Patrols of 1758, 1763, and 1805. Mounted P. are employed on routine duties in the streets, but their special value is as a reserve for use in the control of crowds.

The special constabulary attached to the Metropolitan P. represent an even older branch of the service than the riv. or mounted P., for the appointment of temporary special constables to assist the

ordinary par. constabulary dates from the reign of Charles II. The employment of women as police was suggested before the First World War. Women had long been associated with the P. in such capacities as that of matron to supervise female prisoners. Voluntary patrols worked with the Metropolitan Police from 1916 to 1918, but it was not until 1918 that a small body of women P. was formed as an integral part of the Metropolitan P. The women P. have had a somewhat chequered existence, for in 1922 there was a threat to disband them, but Parliament intervened, and twenty were retained in the Metropolitan P. There were, on 30 June 1957, 527 women in the Metropolitan P., headed by a Chief Superintendent, and women P. in every prov. force in England and Wales and most forces in Scotland totalling 2530.

The Police and Public Carriages: Traffic Control. The P. have a general responsibility as to the operation of all classes of vehicles so far as traffic considerations are affected, and in the Metropolitan Traffic Area the Commissioner of P. for the Metropolis licenses the drivers and conductors of public-service vehicles, trolley cars, and tram cars. The Metropolitan P. license hackney carriages and their drivers, prescribe conditions of fitness of cabs, inspect cabs for fitness, appoint cab standings, and make regulations for the observance of good order at standings, and enforce the Home Secretary's regulations, fixing cab fares and providing for the conduct of drivers, the grant and deprivation of licences, restoration of lost property, etc. (See HACKNEY CARRIAGES.) One of the most important results of the Road Traffic Act, 1930, was the estab. throughout the country of a system of P. traffic patrols. Their primary or special duty is to supervise traffic, but they have all the other obligations of constables, and must attend to any other matter calling for P. action which may be reported to them when on patrol. The patrols do not form a separate estab.; a proportionate number of them are allotted to every div., and for general administrative purposes they form part of the divisional strength. The direction of the P. in other matters in the Metropolitan P. District is assigned to the traffic branch of Scotland Yard under an assistant commissioner. Developments in connection with traffic control include the evolution of a code of standardised signals for P. and motorists and the introduction of automatic signals to regulate traffic crossings.

Police Duties. Sir Richard Mayne, one of the 2 Commissioners of the Metropolitan P. appointed in 1829, defined the primary duties of the P. as follows: 'The primary object of an efficient P. is the prevention of crime: the next that of detection and punishment of offenders if crime is committed. To these ends all the efforts of P. must be directed. The protection of life and property, preserva-

tion of public tranquillity and the absence of crime, will alone prove whether those efforts have been successful and whether the objects for which the P. were appointed have been attained.' The basic duties of the P. to-day are still prevention and detection of crime, protection of life and property, and maintenance of public order, but in the complex development of society the P. have acquired other responsibilities, such as the control and direction of road traffic, and new legislation continues to widen the area of responsibility of the P. For this reason it is impossible to define the extent of P. duty. Acts and omissions which are offences against the Common Law, statutes, or by-laws are matters of concern to P., who, while they do not relieve the citizen of all responsibility for enforcement of the law, are duly appointed to act for and on behalf of the community as guardians of law and order. A wide range of duties has been placed upon the P. by statutes dealing with offences against individuals, against property, against the State and religion, against public order, against vagrancy, and against public justice. Examples of such Acts are the Offences against the Person Act, 1861, the Sexual Offences Act, 1956, the Children and Young Persons Act, 1933, the Malicious Damage Act, 1861, the Larceny Acts, 1861 and 1916, the Coinage Offences Act, 1936, the Forgery Act, 1913, the Treason Felony Act, 1848, the Aliens Acts, the Official Secrets Act, 1911, the Public Order Act, 1936, the Vagrancy Act, 1924, the Perjury Act, 1911, and the Representation of the People Act, 1949. In addition, the P. are called upon to enforce the law in relation to certain aspects of social behaviour, e.g. liquor licensing laws and drunkenness, betting and gaming, public entertainments, public health, prevention of cruelty to animals, and poaching. There are also classes of individuals to whom statutes apply by virtue of their occupation or activity in relation to whom the P. have special duties, e.g. H.M. Forces, dealers in metals, marine stores, firearms or explosives, pedlars, hawkers, pawnbrokers, and money lenders. The duty of the P. in relation to traffic circulation springs from their general responsibility for the protection of life and property, and for that reason the P. are closely concerned with accident prevention, a duty which is carried out by educating the citizens in road safety, particularly in schools, and by enforcing the Road Traffic Acts and Regulations. Also arising from these basic principles of P. duty, the constable must be able to save life by rendering first aid, and he is trained in life saving. On normal patrol, on foot or on wheels, the constable devotes attention to the security of property and is expected, from his observation, to make suggestions to property owners as to improving the security of their premises so that the task of the criminal is made more difficult. The whole emphasis of P. duty is upon

the desirability of prevention rather than cure and upon the need to obtain the co-operation of the citizen to ensure the preservation of the Queen's Peace.

Arrest and Summons. There is no obligation upon the P. to prosecute when an offence against the law is detected. Except in those cases where the Director of Public Prosecutions or the Attorney General must be consulted, the decision as to whether proceedings are instituted is normally made after advice from the constable; other offences may be disposed of by a letter of caution from a senior officer. More serious offences are brought before the Courts by arresting or summoning the offender. Under Common Law every citizen is bound to arrest when a felony is committed in his presence. A citizen may arrest, without warrant, a person reasonably suspected of having committed a felony if, in fact, a felony has been committed. A constable may arrest, without warrant, any person reasonably suspected of having committed a felony whether a felony has been committed or not. He cannot arrest without a warrant on a charge of misdemeanour unless express power to do so has been given by statute; he may, however, arrest without warrant on view of a breach of the peace, but not after the affray is over unless there are reasonable grounds for apprehending its renewal. A person arrested without warrant must be told of the reasons for his arrest unless they are self-evident or there is no opportunity to state them. Such a person must be taken before a Court as soon as practicable, but is normally charged at a P. station before appearing at Court. He is supplied with a copy of the charge against him and, if it is not practicable to bring him before the Court within 24 hrs. he must be bailed by the P. unless the offence is of a serious nature (Magistrates Court Act, 1952, s. 38). Where an offence is committed and the person is not brought before the Court by way of arrest with or without warrant, the P. may lay an information before the Justice of the Peace, who may issue a summons requiring the person to appear before a Magistrates Court. The summons is sufficient if it describes the specific offence in ordinary language, avoiding the use of technical terms, and contains such particulars as may be necessary for giving reasonable information of the nature of the charge. A reference must be made to the section of the Act or other statutory instrument creating the offence, and the time and place at which the accused is required to appear must be stated.

United States. The P. forces may be broadly classified as federal, state, and municipal. The prin. federal P. in 1957 were the Federal Bureau of Investigation, under the Dept of Justice, and the U.S. Secret Service and the Bureau of Narcotics, both under the Dept of the Treasury. The longest-estab. state P. forces, with jurisdiction outside municipalities, are those of Pennsylvania and Texas; the largest probably that of New

York State, with 1348 men in 1957. New York City in 1844 was the first city in the W. hemisphere to establish a well-paid professional P. force like that of Sir Robert Peel in London, and its uniformed force of 23,962 in 1957 was larger than that of any other city of the U.S.A. The P. commissioner who directs it is appointed to a 5-year term by the mayor; and immediately under him are 6 deputy commissioners whom he appoints, a chief inspector, and a chief of staff. Major parts of the force are the patrol force, detective div., traffic div., emergency service div., juvenile-aid bureau, and communication and records div. See Bruce Smith, *Police Systems in the United States* (revised ed., New York), 1949; International City Managers' Association, *Municipal City Administration* (4th ed., Chicago), 1954.

Rank, see RANK, *Police*.

Statistics. On 30 June 1957 there were 68,094 men and 2294 women in whole-time service in P. forces in England and Wales. Those numbers included 16,379 men and 527 women in the Metropolitan P. At the same date there were 8074 men and 236 women in whole-time service in P. forces in Scotland.

See S. Stone, *Justice's Manual*, 1844, 1930; Sir C. E. H. Vincent, *Police Code*, 1844, 1931; Snowden's *Magistrates' Assistant and Police Officers' Guide* (4th ed.), 1859; F. W. Maitland, *Justice and Police* (Citizen series), 1885; E. Carpenter, *Prisons, Police, and Punishment*, 1905; H. P. R. Gamon, *The London Police Court*, 1907 (with bibliography); J. F. Archbold, *Metropolitan Police Guide* (4th ed.), 1922; S. and B. Webb, *English Local Government*, 1922; Sir J. F. Moylan, *Scotland Yard and the Metropolitan Police*, 1929, 1934; C. Reith, *British Police and the Democratic Ideal*, 1943, and *A Short History of the British Police*, 1948.

Police, Military, see MILITARY POLICE.

Polidoro da Caravaggio, see CARAVAGGIO, POLIDORO CALDARA.

Polignac, Melchior, Cardinal de (1661-1741), Fr. diplomat, b. Puy in Languedoc. He studied in Paris and took holy orders. In 1691 he was employed as a negotiator between France and the papal court. In 1693 P. was sent by Louis XIV as ambas. to Poland, where after the death of John Sobieski, he tried unsuccessfully to estab. François Louis de Bourbon, Prince de Conti, as King of Poland. In 1706 he was appointed by Louis XIV auditor of the rota at Rome. In 1709 he returned to France, and in 1710 he was one of the Fr. plenipotentiaries at the congress of Utrecht. In 1713 he was created cardinal, and from 1725 to 1732 he was Fr. minister at Rome.

Polioymyelitis, see INFANTILE PARALYSIS. Pollak Corridor, name given (1921-39) to a strip of ter., previously part of Pomerania (q.v.), which was ceded to Poland by the treaty of Versailles (q.v.) in order to give her access to the Baltic. It was about 80 m. across at its widest, and had a coast-line of some 50 m. on the Gulf of Danzig. The Corridor separated

E. Prussia and Danzig from the rest of Germany, and its existence was a factor in the events leading up to the outbreak of war in Europe in 1939 (see WORLD WAR, SECOND). The port of Gdynia (q.v.) was developed on the Corridor by the Poles after 1920. After the Second World War the Corridor formed part of the 'regained ters.' incorporated in Poland. See POMORZE.

Politburo (Russian abbr. for Political Bureau), main policy-making organ of the Communist Party of the Soviet Union (q.v.). The first P. was formed on the eve of the Oct. revolution (q.v.), though Lenin had always had a policy-making group around him. It was set up as a permanent institution in 1919, when it had 5 members. Towards the end of Stalin's life the P. was reduced to impotence, and it was finally abolished in 1952. After Stalin's death it was re-estab. as the Presidium of the Party's Central Committee, and has now 14 members and 7 candidate members, who are usually referred to as the 'collective leadership' of the party and the country. See M. Fainsod, *How Russia is Ruled*, Cambridge, Mass., 1953.

Politian, or Poliziano, Angelo (1464-94), It. poet and humanist, b. Montepulciano, Tuscany. At the age of 10 he began his studies at Florence. Before he was 20 P. had produced Lat. letters and essays in Gk verse, trans. the first 4 books of the *Iliad* into Lat. hexameters, and produced an ed. of Catullus. His talent was noticed by Lorenzo de' Medici to whom he had dedicated his translation. Lorenzo appointed him tutor to his 2 sons and custodian of his library and collection of antiquities; and P. enjoyed the friendship and patronage of 'Il Magnifico' until the latter's death. He was also prof. of Gk and Lat. literature in Florence. Towards the end of his life he took orders and was made a canon of Florence. He was much affected by the death of Lorenzo, and himself died when on the point of being created cardinal. P. was the author of *Miscellanea*, 1489, dealing with philology and criticism; an ed. of the *Pandects*; Lat. trans. of Herodian's *History*, the *Manual* of Epietetus, the *Aphorisms* of Hippocrates. But P.'s genius was many-sided; he also wrote many beautiful lyrics in Italian, and his Gk and Lat. verses have been declared the best modern examples of their kind. See F. O. Mencke, *Historia vitae inque litterarum meritorum Angeli Politiani*, 1736, and G. de Roberts, *L'Arte di Poliziano*, 1930.

Political Economy, see ECONOMICS, for which it is the older name, generally used in the early and mid-19th cent. It is now favoured anew by some economists.

Political Offences. For all practical purposes except extradition, P. O. stand on the same footing in Eng. law as any other crimes; indeed, in the municipal law of most civilised countries the term P. O. is in no sense a term of art, and any Brit. subject who hoped to found his defence on the ground that his offence was committed in order to further some political object would in an Eng. criminal court

find that his motives would be ignored and his act judged on its merits purely as a criminal one. Formerly P. O. in England generally brought the offenders within the pale of the treason statutes. For example, in the case of *Damarce and Purchase* (1710) 2 men, Daniel Damarce and George Purchase, in the course of the riots arising out of the impeachment of Dr Sacheverell, set fire to certain meeting-houses, and the court held that such burning, as it afforded sufficient evidence of a design to burn down all meeting-houses, constituted an overt act of levying war and hence treason. In strict theory, the outrages committed by the body of agitators popularly known as militant suffragettes constituted treason, for academically acts of war against the Crown for the attainment by force of a public object come within the Treason Act of 1351. But events proved that any attempt to check the activities of these agitators by the use of this rusty weapon of the legal armoury would have been no less ineffective than the whole machinery of the criminal law.

Where a diplomatic representative of a foreign state makes a requisition to the home secretary for the surrender of a fugitive offender, the home secretary may, if he be of opinion that the offence is one of a political character, refuse to order the magistrates at Bow Street to issue a warrant for the arrest of the offender, and he may at any time order a fugitive offender, accused or convicted of a political offence, to be discharged from custody. The Extradition Act, 1870, enacts that a fugitive criminal *shall not* be surrendered if the offence in respect of which his surrender is demanded is one of a political character. If the home secretary issues his order against a political offender and the magistrates act on it, the accused can move in the high court for *habeas corpus*.

Political Parties. For the origin and development of party government generally, and in particular of the Eng. party system, see PARTY GOVERNMENT. P. P. exist in every modern country basing its political system on the W. European tradition. Fascism and Communism are incompatible with them. In countries which became Communist after the Second World War, P. P. were permitted for a time to maintain the façade of democracy, but were later dissolved or merged with the gov. party. P. P. are the inevitable outcome of gov. by representation. Until the 20th cent., and the rise of Socialism, Eng. P. P. were in many ways strongly assimilated, and this situation still prevails in the U.S.A. Elsewhere, notably on the continent of Europe, P. P. were divided by much deeper lines of cleavage, and party gov. was invested with a far greater degree of reality, because party differences either reflected religious or racial differences, or were based upon fundamental political differences which could not be fused together. This remains largely true in Europe, and is now much more applicable

to England in the latter respect. Upon some points parties in England during the 19th cent. were, or seemed to be, for a time irreconcilably opposed to one another; but in practice these differences were mainly on details, and the 2 major P. P. interchanged and absorbed each other's ideas and philosophies to a remarkable extent; e.g. the Tories were, in 1832, fiercely opposed to Grey's Reform Bill, but their lineal descendants, the Conservatives, passed a Bill extending the franchise still further in 1867. The close similarity in viewpoint upon fundamentals which existed between the 2 main Eng. P. P. in the second half of the 19th cent. resulted in a series of political changes so constant and regular that they became known as the 'swing of the pendulum.' The Irish Nationalists, on the contrary, consistently displayed a hostile front; their political creed was racial and religious. This rapidity of interchange of political power was accounted for by the electoral turnovers; a large percentage of electors, acknowledging no particular political beliefs, would vote according as projected reforms would affect them personally. Since the rise of the Labour party the differences between Eng. P. P. have become much more marked. The div. between Conservatism and Liberalism, on the one hand, and Socialism on the other, would appear, on certain fundamental issues, irreconcilable, for all Eng. P. P. claim to serve and represent, and do indeed contain representatives of, all classes; but class conflict has entered Eng. political life. Nevertheless, the 'swing of the pendulum' remains valid. Though each political party can rely on a reserve of support, the 'floating vote' shifts its support between the parties according to events or movements in opinion.

The adoption, since the end of the 19th cent., of proportional representation by many continental countries has resulted in some cases in a large number of P. P., often distinctive only in detail. The electorate has had a wide choice of candidates, and while the major parties are assured of a reservoir of support from members, support for minor parties has varied considerably from election to election. Often no political party has had a clear majority, and coalitions in France have, since the First World War, been the rule. The policies of such coalitions have sometimes differed a great deal, depending upon the dominant party in them, and the consequent instability has caused violent fluctuations in the fortunes even of the major groups. Party stability no longer exists in many cases, though cleavages between the major groups remain.

Amer. party lines, though drawn very closely and severely, not only in the nation as a whole, but also in the 48 states, and even in most of the cities and towns, are based to a large extent on local and historical associations, and doctrinal differences are hard to define. The general tendency in the U.S.A. has been to favour the 2-party system. There have been

others, but they do not carry much weight.

In Britain the contending parties strive for control of the House of Commons, because the leader of the majority becomes Prime Minister and forms the Cabinet. In the U.S.A. as a nation the parties strive to elect the President and, secondly, to secure control of both Houses of Congress in order to assure the passage of party measures. In Great Britain, while the life of Parliament is 5 years, an election may be called at any time upon the advice of the Prime Minister to the sovereign. Elections in the U.S.A. are held every 4 years, and only the law can change them.

See COMMUNIST PARTIES; CONSERVATIVE PARTY; DEMOCRATS; ELECTORATE; LABOUR PARTY; LIBERAL PARTY; PARLIAMENT; PARTY GOVERNMENT; PROPORTIONAL REPRESENTATION; REPRESENTATION; REPUBLICAN PARTY; SOCIALISM; UNITED STATES OF AMERICA, *History*; GERMANY, *History*; FRANCE, *History*, etc. See also J. F. S. Ross, *Elections and Electors*, 1955; R. T. McKenzie, *British Political Parties*, 1955.

Politics, science concerned with the citizen in his relations to the state. It embraces a study of the foundation and general constitution of the state, the P. of nations, the administration of gov., and the principles and method of legislation. Aristotle was the founder of the science, and his fundamental classification of forms of gov. into royalty, aristocracy, and commonwealth, with their parallels, tyranny, oligarchy, and democracy, is still a useful basis. The value of Aristotle's *Politics* is that he fixed the general terminology and classification of forms of gov. (see GOVERNMENT), and considered the sev. possible types of gov., the institution of a model state, and the meaning of 'citizen.' With Aristotle a constitution conceived in the exclusive interest of a class, even of the majority, is wrongful and perverse (Pollock) (see REPRESENTATION). Again, he lays down that a normal or right constitution is one framed and administered for the common good of all, whether the sovereign power be vested in one, with a few, or with the many—a position adopted in allied sciences by every utilitarian philosopher of modern times. The limitations of social progress in Aristotle's time are reflected in his analysis of governmental forms. Many of his definitions and classifications are truisms. He conceived of the small city state as the norm of political life, in which the people could enjoy direct participation in gov.; the problems of the modern nation-state can thus in many cases find no answer in his theories. He could know nothing of the indirect form of legislation and executive power conferred by the right of sending representatives to form a legislative assembly out of which all the members of a modern cabinet are chosen (see CABINET), or of party gov. (q.v.). Again, his analysis is too circumscribed in at least 3 directions. First, he has nothing useful to say about international relations and, inferentially, the

force of treaty obligations (see also COMMERCIAL TREATIES); secondly, his deductions from the true type of the city state leave no room for the science of governing colonies and dependencies; and, thirdly, he altogether underrated the importance of the allied science of political economy. Aristotle did not appreciate the essential oneness of all sciences; he considered political economy as a study of society apart from any constitution or particular form of gov., as something merely auxiliary to the general welfare of the state and the promotion of the most desirable type of life' (Pollock).

Modern political scientists have greatly extended the conception of the democratic form of gov., and of the functions of any kind of gov. Modern factory legislation, laws of public health, and statutory regulation of industrial and provident organisations have no analogy in classic times. Aristotle and a host of later philosophers regarded gov. as the privilege of the cultured and leisured, and the state itself as a limited and privileged class. Plato, whose *Republic* Bertrand Russell described as a 'totalitarian tract,' was, no less than Aristotle, of an aristocratic cast of mind, and his notion of an ideal state is a deduction from the perfectly wise ruler ('philosopher king') as Plato imagined him. Full citizenship was the monopoly of an upper caste, trained for the purpose, and segregated from the masses.

From the time of the merging of the political genius of the Greeks into the Caesarism of the Rom. Empire until the Renaissance there was no room for speculation in P. The Romans had a genius for practical gov., but not only was the very omnipotence of the Caesars hostile to all independent political life, but also the various peoples over whom Caracalla had thrown the aegis of Rom. citizenship themselves seem, during the decline of Rome, to have manifested a political apathy natural in an age that recognised the inevitable ascendancy of the Romans. When the empire of the Caesars gave place to the Holy Rom. Empire and the great feudal kingdoms of W. Europe, the dominant question of the times was the controversy between the temporal power and the spiritual autocracy of the papal see. No medieval writer thought of disputing that unlimited monarchy was the sole guarantee of peace or any measure of freedom, and even the works of Dante (*De Monarchia*) and Aquinas (*Summa Theologica*) are concerned merely with scholastic arguments in favour respectively of the divinely appointed and universal rule of the emperor and the pope. The real revival of the science of P. in a form in any way adapted to the civilisation of modern Europe comes with Hobbes's *Leviathan*, 1651, though the details of statecraft were first worked out by Machiavelli in the *Principe*, 1532. Machiavelli's works are important for their emphasis on the separation of ethics and P., a fundamental separation which is intimately bound up with his unique reputation. In his view

no It. state of the 16th cent. could hope for sovereign independence if morality were allowed to obstruct the free play of the principles and motives of human self-interest upon the art of P.; he appears to postulate absolutism as the only form of gov. Hobbes, believing that security was the greatest wish of human beings, twisted the doctrine of the 'social contract' to reach the conclusion that absolute monarchy must be preferred to its sole alternative, anarchy. In many points he was anticipated by Jean Bodin in his *Six Livres de la République*, 1576. These two publicists recognised the essential attributes of political sovereignty, in particular the superiority of the political sovereign over the laws as a necessary condition of the very conception of a sovereign. Both Bodin and Hobbes were inconsistent. They inclined strongly in favour of despotic power; yet both, especially Bodin, set such moral limits to this absolutism as have a force no less real than that of law. This detraction from genuine absolutism contains the germ of modern constitutional sovereignty, and marks an important advance on such ant and medieval notions of personal and feudal kingship as were consistent only with the view that society was based upon *status* and not *contract*.

The analytical jurist Austin insists upon hard and fast distinctions between sovereignty, morality, and positive law, and so carries the work of Hobbes to its legitimate conclusions; but the speculations of Hobbes and Austin on sovereignty were very far removed from the later conception of the co-existence in every independent state of both a legal and 'political' sovereignty (see GOVERNMENT). In England Parliament, the elected representatives of the people, is legally omnipotent, but morally subordinate to the will of the electorate. Hobbes saw that sovereignty could not be divided, and held that the rights and powers of the sovereign (viz. the powers of legislature and judicature, of making war and peace, of choosing counsellors, of punishing, and of regulating titles) are indivisible and incommunicable, and that though they may be delegated cannot be abandoned.

The latter part of the 17th and the 18th cent. saw a considerable advance in the science of P. The great names (leaving Bentham for later consideration) associated with this period are Locke and Burke in England, and Rousseau and Montesquieu in France. All 4 dealt with the theory of the social contract, and to Burke belongs the credit of having finally disposed of it. There is a contrast between the work of Locke at the end of the 17th cent. and that of Rousseau a century later. Locke in his *Essay on Civil Government*, 1690, defines a political society as one in which every member has quitted his natural powers of preserving his property and punishing others. He refutes the claims of absolute monarchy on the ground that an absolute monarch is incapable of deciding between himself and his subjects. The *Essay* was in-

tended to justify the revolution of 1688 and the estab. thereby of a truly limited or constitutional monarchy in place of the Stuart dynasty claiming to rule by divine right. Rousseau, on the other hand, constructed in his brilliant *Contrat social*, 1762, a theory of gov. and civic rights which appealed so powerfully to the imagination that many of its propositions found their way into the *Declaration of the Rights of Man*; they have equally been claimed for the Hegelian school. Locke, founding his thesis to a certain extent on Hooker's *Ecclesiastical Polity*, postulates as the distinguishing mark of society in a state of nature the want of a common judge with authority; but he disagrees with Hobbes's theory that men in a state of nature are no better than 'brute beasts,' and that the hand of all is raised against all in war, by asserting that even before the beginnings of political society men in the aggregate are at least ruled by reason. He endeavours to establish all the cardinal private rights of civilised mankind as resting upon their own inherent basis of reason before he comes to the point of sealing them with the guarantee of a true political society. Pursuing this purely arbitrary method, Locke goes on to justify the right of the majority to be the ultimate source of political power upon the ground of practical necessity. With the object lesson of the Bill of Rights before him, Locke was safe in saying that the legislature was vested with the supreme power. This is merely another way of saying that all government is founded on consent, though, in an age of a corrupt franchise, it was necessary for Locke somehow to distinguish, so far as England was in his mind, between a dissolution of gov. and a disruption of the political society by war. In short, Locke's purpose was to demonstrate that a moderate constitutional gov. was the only gov. justified by the law of nature, the actual form of gov. being immaterial, though throughout his works it is patent that his hypothetical case is, and could only be, the Eng. constitution. But he was far more concerned to outline a practical concept of gov. than to produce a complete and tidy theory. Locke limits the powers of the supreme legislature by prohibiting the taxation of property without the consent of the people given by themselves or their deputies, the dispensation of justice otherwise than by estab. law and authorised judges, and the transference by the legislature of its powers to any other person or body.

With Rousseau political science reached the limits of its possibilities. The theory of the social contract took the form of a surrender by each and all of their natural rights, not to any sovereign but to the whole society under the sovereign direction of 'the general will.' Since, therefore, each individual receives in exchange, as it were, an inseparable part of the whole communal sovereign power, he is, in the last resort, as free as he was prior to entering into the *contrat social*. The resulting paradox is that there is no sovereign in Rousseau's state in the

sense in which Hobbes, Locke, and other writers use that term, the community itself being at once a corporate sovereign entity and an aggregate of unrelated subjects, governed not directly but only mediately by whatsoever form of gov. may happen to exist in the particular community. Rousseau's theories have but little to say on *legality*, for the simple reason that with him the laws imposed by the general will cannot be unjust, and to be the true expression of the general will must themselves be characterised by generality. The most obvious and far-reaching deductions from Rousseau's theories are: (1) that all men are equal; (2) that no monarch has any title to sovereignty; (3) that all existing govts. inevitably strive to monopolise sovereign power; (4) that political society is generally overwhelmed by its rulers and so perishes (a palpable invitation to the Fr. people to save themselves); and (5) the futility of Eng. representative gov. as an alternative to the ideal Gk city-state, because it is utterly inadequate to express the general will. The greatest difficulty lies in the trans. of the general will into actual gov. Rousseau himself provides no satisfactory solution.

Against Rousseau's somewhat nebulous theories stands the *Esprit des lois*, 1748, of Montesquieu. Montesquieu's work heralded the dawn of the historical as opposed to the analytical method. Although Montesquieu's information was 'often crude and imperfect, his inferences often hasty, and his judgment often misdirected,' he is thought to have substituted the method of induction from facts for *a priori* deduction. The errors of the historical school were seen later. Besides his method of political science, Montesquieu's contribution to P. included a comparative theory of legislation and institutions suited to the political needs of different forms of gov. and a comparative theory of P. and law based on a comprehensive observation of the systems of different countries and epochs. Bentham (q.v.) carried the former of these ideas into execution, while Maine, Lohbntz, Savigny, Seeley, Bluntschill, and Spencer evolved the latter idea. Burke's *Reflections on the French Revolution*, 1790, together with his other works, is the true precursor of the historical method. His importance in the development of the science of P. lies in his recognition of the fact that civil society is not a machine but a social organism and a social discipline, and that therefore the guiding light of any politician should be nothing but such rules of equality and utility as are favourable to the preservation of all existing rights and liberties.

Bentham's *Fragment on Government*, 1776, is discussed in the article on him. He regards the salient feature of a political society as the *habit of obedience* manifested by a number of persons towards other persons 'whom we may call governor or governors.' The power of the sovereign he treats as unlimited, though there is all the difference possible between the legal

duty of obedience to the supreme legislature and the political doctrine of non-resistance. Even later writers on sovereignty, like Dicey, recognise the fallacy of a limited supremacy, though to Dicey belongs the credit of making something like an adequate distinction between legal and political sovereignty. But in Bentham's age it was still necessary seriously to consider the nature and authority of the state *qua* state and to assert the sanction of positive law. A great number of his deductions were far in advance of his time. Reform has almost down to the present day been consistently along the lines of his suggestions.

The science of P. as it stands to-day concentrates upon the science of legislation, or the discussion of what matters should be controlled by the State and what left to individual discretion. Theories of the State and of sovereignty require detailed discussion in view of 3 developments: (1) the binding together of a number of states in a federal union; (2) the promulgation of written or rigid constitutions; and (3) international law (q.v.). According to Dicey, the legal sovereign power in states having a written constitution (as have all federal states) is strictly a dormant power called into play only when changes in the letter of the constitution are contemplated. The wealth of discussion on the appropriate sphere of legislative activity, or the limits of state intervention, was rendered possible by Bentham's important contribution to P., viz. the obligation of the sovereign to make laws. Before the 19th cent. comparatively few Acts will be found in the Statute Book, the duty of the State not being considered to extend far beyond the irreducible minimum of preserving order within the ter. and repelling external aggression.

The prin. Eng. exponents of the historical method, as opposed to the analytical or deductive, are Sir H. Maine (*Ancient Law, History of Early Institutions*, and *Village Communities*) and Herbert Spencer. But this method has attained its perfection rather in Germany at the hands of Savigny, Ahrens, and others, who, however, arrive at very much the same results as to the meaning, nature, and functions of political institutions as the school which is commonly opposed to them.

Some political theorists brought philosophy to bear more closely upon the science of P. Duguit in France and Laski in England contended that a system of direct representation of economic and professional interests should take the place of representation based upon ter. and pop. Syndicalism went beyond this in condemning all political action as hitherto understood, on the ground that the State, being built upon force and obedience, cannot achieve a minimum of restraint on the individual. On the other hand, public opinion is as important an element in the foundation of the 'State' as is force. G. D. H. Cole, who does not go so far as the syndicalists, contends that

the State 'should own the means of production, the guild should control the work of production.'

The U.S.A. presents unique political problems of a special interest. For the U.S.A., as also Canada and Australia, illustrate the principle of federalism, probably the only political system which has more or less successfully solved the great problems in the transference of people of an old civilisation to virgin soil. These people of every stage in civilisation and education have been promptly admitted to citizenship and have settled peaceably in their new country. Peculiar problems are a natural consequence, such as the kind of nationality which is ultimately to emerge as really 'American,' and the balance between E., W., and the Middle W. (q.v.).

There is a time-lag between new political ideas and the conditions which favour their application in practical P., and ideas in all ages have been forces, and most of all when the so-called practical men who were impregnated by them were not conscious of their motive power. Among the ideas and doctrines which are active to-day are those of Karl Marx and Friedrich Engels, which supplied the driving power to Lenin's political experimentation. Yet behind Marx lies the dialectic of Hegel, though the latter's undoubted influence on Brit. Idealism would have been slight had not Marx been his disciple. Together Hegel and Marx achieved a real revolution in the orbit of political ideas, a revolution which reinterpreted the axioms of the rationalistic philosophy of Liberalism as a new attitude to the historical process and to man's place in that process. Marx reconciled Hegel's concept of the historical process with belief in man's freedom to remould his own world by his theory of Dialectical Materialism. Freedom, declares Marx, is only possible when the historical dialectic is regarded as the conflict of social and economic forces, directed according to laws ascertainable by social science. Engels, like Marx, was insistent both that political democracy must be abolished and that independent states must disappear, so as to pave the way for a world revolution which would subvert capitalism in all countries and convert the world into a union of socialist republics.

Modern authoritarian thought has many of its roots in Hegel's *Grundlinien zur Philosophie des Rechts* (The Fundamental Lines of the Philosophy of Right), particularly in his conceptions of the rational character of the State, of freedom as service to the State, and of hist. as the revelation of the reality of the spirit. Nietzsche's influence on political thinking is seen chiefly through his idea of the superman and the pseudomesianic manner in which he conveyed this conception. But slogans or catchwords, as well as philosophical doctrines, have not seldom in modern times exerted a profound influence in P. The theory of the myth was first expounded in Sorel's

Reflections on Violence and developed into a philosophy by Pareto. Hitler and Mussolini showed that, in an age of slogans and propaganda, men of action can, for their own ends, distort ideas that have long been current in more or less academic discussion. Thus Hitler's nationalist slogans owed something to the impetus given by Herder to national consciousness and to Fichte's arrogant *Addresses to the German Nation*; while Mussolini's Fascist utterances were related to the philosophy of Hegel and to Mazzini's nation-state theories, and also to the doctrines of Sorel. Hitler's racial theories, if they may be so styled, were mere political window-dressing directly traceable to the confused ethnical theories of Gobineau, Houston Stewart Chamberlain, and others. The principle of self-determination, as conceived by Woodrow Wilson, was merely a statement of the nation-state doctrine, but with a clearer perception of the connotation of 'nation,' 'race,' and 'people,' and of their interrelationship.

See also COMMUNISM; IDEOLOGY; INDIVIDUALISM. See W. Lippmann, *A Preface to Politics*, 1913, and *The Good Society*, 1937; Viscount Bryce, *Modern Democracies*, 1921; B. Bosanquet, *The Philosophical Theory of the State* (reprinted), 1930; H. Finer, *The Theory and Practice of Modern Government*, 1932; B. Russell, *Freedom and Organisation, 1814-1914*, 1934; H. J. Laski, *The State in Theory and Practice*, 1935, and *Grammar of Politics*, 4th ed. 1948; W. H. Hutt, *Economists and the Public*, 1936; L. C. Robbins, *Economic Planning and International Order*, 1937, and *The Theory of Economic Policy*, 1952; A. V. Dicey, *Law of the Constitution*, 9th ed., 1939; E. Jenks, *The Ship of State*, 1939; C. Streit, *Union Now*, 1939; F. A. Hayek, *The Road to Serfdom*, 1944. See bibliography of LIBERALISM.

Poliziano, see POLITIAN, ANGELO.

Polizzi Generosa, tn in Sicily (q.v.), 41 m. SE. of Palermo (q.v.). Pop. 8000.

Polk, James Knox (1795-1849), eleventh president of the U.S.A., b. Mecklenburg co., N. Carolina, and educ. at N. Carolina Univ. In 1820 P. was admitted to the Bar. From law he turned to politics. The first public capacity in which he served was the chief clerkship of the Tennessee House of Representatives. From 1835 to 1839 he was Speaker of the U.S. House of Representatives. In 1839 he was nominated by the Democrats of Tennessee as governor of the state and was elected. In 1844 he was nominated by the Democrats for the presidency. The convention advocated the annexation of Texas and the immediate occupation of Oregon. The Whigs nominated the famous Henry Clay. P. was elected. Before he was inaugurated, Texas had already been annexed to the U.S.A. P., as president, said the country must settle the Oregon boundary and acquire California. Oregon, as then thought of, was a remote unsettled region between 42° and 54° 40' N. lat., and extended from the Rockies to the Pacific. Both England

and the U.S.A. claimed it on account of discoveries and explorations of their nationals. Had England yielded, Canada would have had no Pacific coast. England proposed that 49° be the boundary line, and this was accepted. The Californian question was settled by the war with Mexico. As a result of the Oregon settlement, and of the annexation of Texas and California, the U.S.A. acquired about 1,200,000 sq. m. and completed its continental expanse.

Polka, dance said to be of Bohemian origin, introduced into Prague about 1835, later to Vienna, and to Paris in 1840, after which it achieved universal popularity. It arrived in England (1843-5), and was immediately acclaimed. A theatrical version was performed by Perrot and Carlotta Grisi, attired in Hungarian dress, at Her Majesty's Theatre. The early ballroom P. included a promenade, the gentleman and lady moving forwards, side by side, or one backwards and the other forwards, sometimes with the addition of a heel and toe step added to the P. step. Danced to 2/4 time, the usual position adopted by the couple was the same as that for the waltz, the dancers turning around to the right or the left, while progressing round the room.

Poll, see ELECTIONS.

Poll Tax, or **Capitation Tax**, tax levied on the individual. It was employed in ancient Athens, and sev. famous levies have been made in England. The first was in 1377, and the poll-tax levied in 1380 led to Wat Tyler's rebellion. It was a favourite means of raising money under the Stuarts. Many Amer. states have employed a poll-tax to prevent Negroes and 'poor whites' from voting.

Pollack (*Gadus pollachius*), fish closely related to the cod-fish; belongs to the cod-fish family, Gadidae. It has no barbel depending from its chin, and its lower jaw projects beyond the upper. Like others of its genus, it is carnivorous.

Pollaiuolo, Antonio (c. 1432-98), Florentine painter and metal worker. He studied under the goldsmith Bartoluccio, stepfather of Ghiberti, and later assisted the latter in modelling the gates for the Baptistry of Florence, completed in 1452. He also worked as a goldsmith and as a sculptor in bronze, and the monuments to Popes Sixtus IV and Innocent VIII, in St Peter's at Rome are his work. His vigorous paintings show the interest of the time in anatomical study. A good example is the 'Martyrdom of San Sebastian' (National Gallery). With him worked his brother Piero (c. 1441-96).

Pollaiuolo, Simone del (1454-1509), Florentine architect. He studied in Rome, and on returning to Florence was employed by Strozzi to complete the palace begun for him by Benedetto Maiano in 1489. He also designed the council hall of the Signoria and the sacristy of San Spirito.

Pollan, see COREGONUS.

Pollard, Albert Frederick (1869-1949), historian, b. Ryde. Educ. at Portsmouth

Grammar School, Felsted School, and Jesus College, Oxford. He was assistant editor, *Dictionary of National Biography*, from 1893 until 1901, and was prof. of Eng. hist., univ. of London, from 1903 to 1927. Later he was director at the Institute of Historical Research. Besides 500 articles in *Dictionary of National Biography* and considerable portions of *Cambridge Modern History* and *Political History of England*, P.'s works include *The Jesuits in Poland*, 1892; *Henry VIII*, 1902; *Reign of Henry VII*, 1913-14; *Short History of the Great War*, 1920; *Factors in American History*, 1925; and *Wolsey*, 1929.

Pollard, Alfred William (1859-1944), bibliographer, b. London and educ. at King's College School and St John's College, Oxford. He worked for nearly 42 years in the dept. of printed books, Brit. Museum, for the last 5 as keeper. He succeeded Furnivall as director of the Early Eng. Text Society, and ed. Herrick in the Muses' Library. Produced *English Miracle Plays* for the Clarendon Press, and ed. Chaucer. He became secretary of the Bibliographical Society which, in 1926, produced the *Short Title Catalogue* of books printed in Eng. (1475-1640) and, in 1939, Greg's *Bibliography of the English Printed Drama to the Restoration*. P. planned and directed the *Catalogue of Books printed in the XVth Century now in the British Museum*, 1908-10. In 1909 appeared the famous *Shakespeare Folios and Quartos*, with its support of the integrity of the ordinary early printers and publishers. After this appeared his *Records of the English Bible* and in 1916 he pub., in collaboration with H. O. Bartlett, *A Census of Shakespeare's Plays in Quarto* (1594-1709).

Pollarding, practice of lopping off the top or head of trees to the main stem to cause it to form a number of young branches. Willows and poplars are the only trees commonly so treated.

Pollen, **Pollen Grains**, powder-like contents of the anthers of flowering plants. Each grain is a single cell, containing the male gamete, nucleated protoplasm, and granular nutritive material, enclosed in a thin inner coat, or *intine*, and thicker outer coat, or *exine*. P. grains are of various forms, but characteristic of their species, and colour is usually yellow, but may be deep orange, red, purple, blue, green, or almost black. A P. grain reaching a stigma germinates, extending a P. tube through which the male gamete descends through style and ovary to an ovule to unite with the female gamete of the egg.

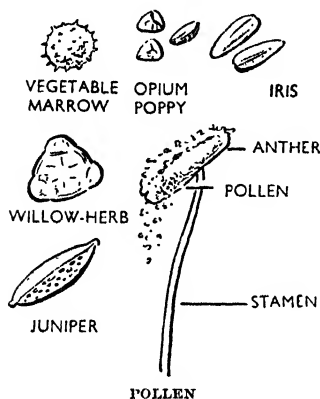
Pollen-analysis, see PALYNOLOGY.

Pollensa, Sp. tn in the N. of the Is. of Majorca (q.v.). It has a ruined Rom. bridge, and sev. interesting churches, and there is a trade in wine. Pop. 10,000.

Pollenza, It. tn, in the Marches (q.v.), 6 m. WSW. of Macerata (q.v.). There are numerous Rom. remains. Pop. (com.) 6000.

Pollination, transfer of pollen from anther to stigma by the agency of insects

or by the wind. The P. of plants of different species is hybridisation. See HYBRID.



Magnification, about 40 diameters.

Pollock, Sir Frederick (1845-1937), jurist, grandson of Lord Chief Baron P., 1st baronet, b. London; educ. at Eton and Trinity College, Cambridge. He was called to the Bar in 1871. P. was prof. of jurisprudence, Univ. College, London, 1882-3; Corpus prof. of jurisprudence, Oxford, 1883-1903; prof. of common law at Inns of Court, 1884-9. He was made P.C. in 1911; and in 1914 he was appointed judge of Admiralty Court of Cinque Ports, and became K.C. in 1920. Among his many publs., sev. of which are standard works, were text-books on common law, torts, maritime law, and, in collaboration with Sir R. Wright, *Possession in the Common Law*, 1888. In collaboration with F. W. Maitland he wrote a *History of English Law*, 1895. His *Principles of Contract* went into its tenth ed. in 1936. *The Elchingham Letters*, 1899, is an entertaining *feu d'esprit* written in collaboration with Ella Fuller Maitland. He was ed. of the *Law Quarterly Review* from 1885 to 1919, and ed.-in-chief of the *Law Reports* from 1895 to 1936. P. ed. the Lincoln's Inn MS. of Selden's *Table Talk*, 1927.

Pollok, Robert (1799-1827), poet, b. Eaglesham, Renfrewshire, son of a farmer. He was educ. at Glasgow Univ., and became a minister in the United Secession Church. He wrote *The Course of Time*, 1827, a didactic poem in 10 books, after the manner of Cowper and Young. It is very uneven, but had a great contemporary reputation. His *Tales of the Covenanters*, a work in prose was pub. in 1833. See life by D. Pollok, 1843.

Pollonarus, see POLONARUWA.

Pollution, see AIR POLLUTION; NUISANCE; PUBLIC HEALTH, *Pollution of Water*; WATER SUPPLY.

Pollux, see GEMINI.

Polo, Marco (1254-1324), Venetian traveller. He was b. of a noble family, and at the time of his birth his father and uncle were absent on a commercial expedition to China, where they were asked to return by Kublai Khan. This they did in 1271, taking Marco with them. They travelled by way of Mosul, Bagdad, Khorassan, the Pamir, Kashgar, Yarkand, Khotan, Lob Nor, the Gobi Desert, Tangut, and Shangtu, and reached the Khan's court in 1275. The Khan sent Marco as an envoy to Yunnan, Burma, Korakorum, Cochin China, and India, and for 3 years he acted as governor of Yangchow. The P.s finally left China in the train of a Mongol princess, and returned by way of Sumatra, India, and Persia to Venice, which they reached in 1295. In 1298 Marco received the command of a vessel in the fleet fitted out against Genoa, and was made prisoner after the Venetian defeat at Curzola. While in captivity he dictated an account of his travels to Rusticiano of Pisa. This work, which suffers from the monotony of its style, has been trans. into many languages; Eng. eds. are those of J. Marsden (1818), T. Wright (1834), H. Murray (1844), Sir H. Yule (1871, revised and augmented by H. Cordier, 1903), and in Everyman's Library, ed. by J. Marsden.



See life by G. Danielli, 1941; also G. F. Hudson, *Marco Polo and the Discovery of China*, 1949.

Polo (Tibetan *polo* or *pulu*, ball), a ball game played on horseback, one of the most ancient of games. It probably originated in Persia, where it was certainly played before 500 BC, and has been described by Firdawsi (q.v.), the Persian poet. The game was early known in Byzantium, afterwards finding its way into Japan and China, and thence to Tibet and India. The first recorded description of an international P. match is given in Firdawsi's *Shāhnāma* (11th cent.), the game being between Persian and Turkish teams. The beginning of the modern game of P. in England dates from the 19th cent. P. quickly became

popular, especially in the Army, clubs being formed in Monmouth (actually the first), London, Rugby, and Dublin. A full-size P. ground is 300 yds by 200 yds; the ideal goal-posts are made of basket work, as these may be readily repaired, though it is very usual to have them made of Willesden paper, so that they may break easily if collided with. Each goal is 8 yds wide, and the goal-posts are at least 10 ft in height. The stick (Amer. mallet) consists of a cane handle about 52 in. in length, set into a head which takes various forms according to the particular fancy of the owner. The ball, usually made from the willow-tree root, is 3½ in. in diameter and 5½ oz. in weight, though sometimes balls made of 'Exelite' are used. There are 4 players on each side. P. ponies are bred and trained for the game, and are almost always thoroughbreds. After the First World War the height limit of ponies was abolished in England and in India to conform to its abandonment by the rest of the world.

The governing body of Brit. P. is the Hurlingham P. Association, which has nearly a score of affiliated clubs playing under its jurisdiction and represented in its council. P. is no longer played in London, the nearest club being the Ham P. Club, with a ground at Ham House, Richmond.

The Amer. game is faster than the Eng. Meadow Brook Club, where P. was first played in 1879, is the Hurlingham of America, and before the Second World War over 100 P. clubs belonged to the U.S.A. P. Association. In 1886 the first P. match was played between Britain and the U.S.A., and Great Britain won. The second match was played in 1902, and Great Britain again won, and did so once more in 1914, but since that date the U.S.A. has won every match. Owing to economic stringency following the Second World War, the recovery of the game in England was slow, being handicapped especially by a lack of ponies, which is, however, being rapidly overcome, mainly by imports from the Argentine. The game is becoming increasingly popular in England, and crowds of 10,000-15,000 can be found at Cowdray or Windsor Parks on big occasions.

In America in the spring of 1949 a series of international matches were played between the Argentine and America; in Italy the game has been revived at Rome; in Spain there is regular play at Madrid; and in France an important international series of tournaments takes place at Deauville each Aug. There are more than 40 clubs in S. Africa, and there is regular play in Malta. In England there is P., mainly on Saturdays and Sundays, at the surviving clubs, which include Cowdray Park, the Ham Club, the Rhinefield (in New Forest), the Taunton Vale Club, Cirencester Park, and the Household Brigade Club (Windsor Great Park). The rules of P. and expert coaching will be found in the Earl of Kimberley and others, *Polo*, 1936; see

also R. L. Ricketts, *First Class Polo, Tactics and Match Play*, 1928; E. D. Miller, *Modern Polo* (6th ed.), 1929; and H. T. Doring, *The Hurlingham Club*, 1869-1953, 1953.

Polo, Water, see WATER POLO.

Polo Pony, see HORSE.

Polonaise, or **Polonez**, one of the oldest of Polish national dances, thought to have originated as a triumphal war march, performed by men only. From the late 16th cent. it was used as a ceremonial march in courtly and aristocratic circles. State balls opened with a *Polonez*, the couples promenading round (one behind the other), and sometimes passing through, all the state rooms. As a social dance of the 19th cent. it became known in all European countries. The music, in 3/4 time, is reflected in the step, being a stately march with an accented movement on the first beat. Figures introduced into the ballroom version derive from a later, spectacular form. Chopin's P. in A major, used for dancing for over 100 years, has been regarded in recent times almost in the nature of a national anthem—for example, during the invasion of Poland in 1939.

Polonium, first radio-active substance to be recognised by the Curies in 1896. Symbol Po; atomic number 84; approximate atomic weight 210. It was named after Poland, Marie Curie's native country. It is found in combination in pitchblende, and is identical with radium F. See RADIUM.

Polonnaruwa, second cap. city of anct Ceylon from AD 769, situated 76 m. N.E. of Kandy on the road to Trincomalee. Most of the historic ruins, which belong to the 12th cent., have been partially, or almost fully, restored, and they are in a better state of preservation than those of the older cap. city of Anuradhapura. Most impressive and spectacular, the remains at P. belong to a period when the famed Parakrama Bahu the Great made an epic of Ceylon hist. The city owed much of its beauty and magnificence to this great king, who combined the professions of warrior, student, artist, agriculturist, builder, and administrator.

Much survives of the viharas, dagabas, monasteries, palaces, bathing-pools, shrines, statues, and inscriptions. Among the ruins (some of which show evidence of Tamil influence in rich architectural design), the Vata-de-go' (round relic house), the Kalugal Vihara (black granite temple), the king's winter palace, the Sat-mahal-pasada (7-storied palace), the royal lotus baths, the Kiri-, Pabuli-, and Rankot-Viharas, and the temples of Lankatilleke', Jetawanarama, and Thuparama need special mention. A mile away, on the other side of the P. resthouse, the large stone statue of King Parakrama Bahu (though some experts think it is that of a Hindu saint), holding an ola, or palm-leaf, MS. which was found among the ruins of the Potgul Vihara (Parakrama's library), is of special interest. The city is also surrounded by large 'tanks' (irrigation

reservoirs), including the recently restored 'Parakrama Samudra,' which provide a convincing indication of the advanced culture and high civilisation that then obtained in Ceylon.

Polotsk, tn in the Vitebsk Oblast of Belorussia (q.v.), on the W. Dvina Riv., an important railway junction (five lines converge on P.). The tn has been known since 862, and from the 10th cent. it was the cap. of P. principality, which maintained independence from Kiev (see KIEVAN RUSSIA) but fell under Lithuanian suzerainty in 1307 and was abolished in 1385. It became Russian in 1772. P. was occupied by the Germans from 1941 to 1944 and was largely destroyed in bitter

becoming Lithuanian in 1362, Polish in 1569, and Muscovite in 1667.

2. Cap., economic and cultural centre of the above, 70 m. SW. of Khar'kov. There are food, textile, and metal-working industries, and it is a railway junction. It has interesting 17th-19th-cent. buildings. Known since 1174, it was a centre of the Ukrainian Cossacks in the 17th cent., and became prov. cap. in 1862. In the 18th-19th cents. it was a lively commercial centre, and in the 19th cent. it was one of the main centres of the Ukrainian literary and national movement. Peter I defeated Charles XII and Mazepa at P. in 1709. Pop. (1956) 129,000 (1939, 130,000).



Dept. of Information, Ceylon

KIRIVIHARA, POLONNARUWA

fighting. From 1944 to 1954 it was cap. of P. Oblast (now abolished). P. has a number of 11th and 12th cent. churches. Flax, linseed, corn, and timber are the prin. articles of commerce. Pop. (1933) 25,000 (in the 16th cent. over 100,000; c. 1914, 31,000). See also EASTERN FRONT, RUSSO-GERMAN CAMPAIGNS IN SECOND WORLD WAR.

Poltaratsk, see ASHKHABAD.

Poltava: 1. Oblast in Central Ukraine, on the l. b. of the Dnieper, lowland wooded steppe with mostly Black Earth soils. Pop. (1956) 1,634,000, almost exclusively Ukrainians (before the war also Jews). Wheat, sugar beet, and sunflowers are grown, and cattle and hogs (Mirgorod breed) raised; there are varied food, metal-working, and light industries. The prin. tns are P., Kremenchug. The area belonged to Pereyaslavli' principality,

Poltergeist (Ger. 'noisy ghost'), name given to an alleged ghost, agency, or spirit manifesting unpleasantly in a house. Identical phenomena attributed to P.s have been reported from all parts of the world and throughout all ages. Classic alleged P. cases include the Drummer of Tedworth (1662), Epworth Rectory (the Wesley P.) (1716), Ballechin House (1892), and Borley Rectory (1929-39). The late Harry Price (q.v.) conducted extensive researches into the latter case. P. disturbances include noises of every description, especially bell-ringing; movement, appearance, and disappearance of objects; articles thrown about, strange smells, and fire-raising. Serious physical injury is rare, although on occasions great force is displayed. All types of house are apparently liable to infestation, which ceases after a period of time, sometimes

a few days, sometimes years, as suddenly as it began and for no apparent reason. An adolescent is frequently a member of the household concerned, and she (it is more often a girl than a boy) appears to be the nexus of the disturbances, apparent phenomena increasing when this person is asleep, a condition comparable to the spiritualistic trance state. On occasions the disturbances are found to be the result of fraud, conscious or unconscious, on the part of the adolescent. Only rarely are P. phenomena accompanied by an apparition. See H. Dreisch, *Psychical Research*, 1933; W. H. Salter, *Ghosts and Apparitions*, 1938; E. Bennett, *Apparitions and Haunted Houses: a Survey of Evidence*, 1939; S. Sitwell, *Polltergeists*, 1940; H. Price, *Polltergeists over England*, 1945; and H. Carrington and N. Fodor, *The Story of the Polltergeist down the Centuries*, 1953.

Polyaenus, Gk author and rhetorician of the 2nd cent., b. Macedonia. He served in the army, and later entered political life. His chief work, *Strategemata*, in 8 books, was trans. into Eng. by R. Shepherd, 1793.

Polyandry, a form of marriage in which one woman is married simultaneously to more than one man. Frequently the co-husbands are brothers, the form then being known as Adelphic P. It is found mainly in parts of Tibet, Assam, and India, as among the Nayars (q.v.), and is usually associated with matrilineal descent and matriarchy (q.v.).

Polyanthus, spring flower (family Primulaceae), of which many varieties, gold-laced, double, and self-coloured, have been raised. The P. is believed to have been originated as a cross between the primrose and the cowslip.

Polybius (c. 204-122 BC), Gk historian of Rome, son of Lycortas, b. Megalopolis in Arcadia. After the Rom. conquest of Macedonia, P. was conveyed to Rome with 1000 Achaeans on the charge of refusing to assist the Romans against Perseus (168 BC). The prisoners were settled in the Etruscan tns, but through the influence of Aemilius Paulus, P. was treated with exceptional leniency and was permitted to settle in Rome. Scipio offered liberal patronage to the exile, and granted him access to public records relative to his great work. P. accompanied Scipio on his campaign against Carthage. After the destruction of Carthage P. crossed to Greece, where his countrymen were in open rebellion against Rome, and secured lenient terms of peace for the defeated insurgents. The *History* of P. covered a period of Rom. hist. extending from 221 to 144 BC. It is one of the most valuable works that has come down to us from antiquity; but unfortunately the greater part of it has perished. The first 5 books are extant, but of the rest only fragments and extracts remain. The best Eng. ed. is that of W. R. Paton (6 vols. with trans., 1922-7). See J. P. Mahaffy, *Greek Life and Thought*, 1896; J. B. Bury, *Ancient Greek Historians*, 1909.

Polycarp, Saint (c. 69-156), Bishop of Smyrna and one of the Apostolic Fathers. Knowledge of his life is gathered from Irenaeus, Eusebius, and the anonymous *Martyrium Polycarpi*, partially incorporated into Eusebius's *Ecclesiastical History* (iv. 15). He was visited by Irenaeus as the latter passed through Asia Minor on his way to martyrdom at Rome, and from him, also, he later received an epistle. P. himself was the author of an epistle to the Philippians. Irenaeus was indeed a pupil of P., while P. himself is said to have spoken with St John the Apostle and to have been converted to Christianity by him in 80. Shortly before the end of his life, P. visited Rome to confer with Pope Anicetus as to the date for the celebration of Easter, and on his return to Smyrna suffered martyrdom at the stake, showing great courage and constancy. Eusebius places his martyrdom in the year 166, but modern research has made the date 156 more probable. See J. B. Lightfoot, *Apostolic Fathers*, II, 1877-85, and H. Rahner, *Die Märtyrerakten des zweiten Jahrhunderts*, 1941.

Polycarpon, genus of ann. herbs, with flat-whorled leaves and minute flowers in cymes. P. *tetraphyllum*, 4-leaved all-seed, a small prostrate plant, is Brit.

Polyclitus of Argos (fl. 440 BC), Gk sculptor, pupil of the Argive sculptor, Ageladas, and a contemporary of Pheidias and Myron. Several works have come down to us in copies, notably the Doryphoros (youth with javelin) and the 'Wounded Amazon.' See A. Mahler, *Polykletus und seine Schule*, 1902.

Polycotyledonous Plants, those which have more than 2 cotyledons, an uncommon condition almost confined to the Gymnosperms (q.v.).

Polyrates of Samos, Gk tyrant, friend and patron of Anacreon. Having estab. a tyranny at Samos, he collected a fleet, mastered the Aegean, and by ubiquitous piracy amassed a great fortune. P., in order to avoid the enmity of the gods, threw his most valuable possession, a ring of rare beauty, into the sea. The ring, however, was discovered in the maw of a fish which had been presented to the tyrant. Not long afterwards he was enticed to the mainland by the satrap of Sardis and crucified (522 BC).

Polydeuces, see CASTOR AND POLLUX.

Polydorus: 1. King of Thebes, son of Cadmus and Harmonia.

2. Youngest son of Priam, slain by Achilles.

Polyethylene, see PLASTICS.

Polygala, see MILKWORT.

Polygamy, marriage with more than one spouse simultaneously; it is of 2 varieties, Polygyny (q.v.)—one man and sev. wives—and Polyandry (q.v.)—one wife with sev. husbands.

Polygenetism, see LANGUAGE, ORIGIN OF.

Polyglot (Gk *polus*, many, and *glōtta*, tongue), book which contains sev. versions of the same text in different languages, arranged side by side in parallel columns so as to facilitate comparison. By far the

greater number of such works have been eds. of the whole or part of the Bible, and the term is usually applied to P. Bibles, in the absence of any express notice to the contrary. The oldest is the *Complutensian Polyglot*, 1514-17, ed. in 6 folio vols. under the supervision of Cardinal F. Ximenes in Alcalá (the Rom. Complutum), in Spain; vol. i contains the N.T. in Greek and Latin; vols. ii-v contain the O.T. in Hebrew, Vulgate, Septuagint (with Lat. trans.), the (Aramaic) Targum Onkelos (with Lat. trans.), and a Gk-Lat. dictionary. The *Antwerp Polyglot* (8 vols. folio), 1569-72, included, besides the languages given in the *Complutensian Polyglot*, a Syriac version and the Targums on parts other than the Pentateuch, as well as dictionaries and archaeological treatises. The *Antwerp Polyglot* is also known as *Plantiniana* after the printer Plantin. The cost of its pub. was defrayed by Philip II (of Spain), hence this P. is also called *Biblia Regia*. The editor of this work was the famous theologian Arias Montanus. The *Paris Polyglot* (10 vols.), 1629-45, gave another Syriac version (*Peshitta*), together with a version in Arabic (with Lat. trans.) and the Samaritan Pentateuch (with Lat. trans.). Most important of all is the *London Polyglot* (8 huge vols.), 1654-7, to which the *Prolegomena* forms a most valuable addition. The *London Polyglot* was edited by Brian Walton (hence it is also known as *Walton P.*) and E. Castellus (prof. of Arabic at Cambridge); it contains all the material of the *Paris Polyglot*, and also parts of the *Vetus Latina*, of the Ethiopic and Persian versions (with Lat. trans.), sev. important treatises, in parts an *apparatus criticus* (thus being the only one amongst all the P.s. of any critical value), and readings of about 30 MSS. (In 1669 a lexicon *heptaglotton* was pub. by Prof. Castelli.) Of much less importance are a few P.s. ed. in Germany, such as the *Hamburg Polyglot* (1587 ff.) and the *Nuremberg Polyglot* (1599 ff.), ed. by Elias Hutten, and the *Bielefeld Polyglot* (Hobrew, Greek, Latin, German), ed. nearly a century ago by R. Stier and K. G. W. Theile.

Polygnotus (fl. 500-425 bc), Gk painter, b. on the is. of Thasos, came to Athens in the time of Cimón, and was honoured with the citizenship. At Athens he executed mural paintings of the 'Sack of Troy' in the Stoa Poecile and of the 'Rape of the Leucippidae' in the shrine of the Dioscuri. His most famous works, however, were the 'Sack of Troy' and 'Ulysses in the Underworld' at Delphi. P. excelled chiefly in the delineation of character in the human face, and this quality of his work receives unqualified praise from Aristotle and other anc. critics. See H. E. Walters, *Greek Art*, 1903, and *The Art of the Greeks* (31st ed.), 1934.

Polygon, plane figure bounded by straight lines. The simplest P. is the triangle, but the name is usually restricted to figures with more than 4 sides, pentagons, hexagons, heptagons, octagons,

etc. The general mathematical theory of plane P.s. defines them as any finite series of points joined in pairs by straight lines, which allows for forms with re-entrant angles and intersecting lines.

Polygon Wood, see YPRES, BATTLES OF. **Polygonaceae**, family of herbaceous plants, bearing leaves with sheathing stipules and spikes or panicles of flowers. Among the genera are *Calligonum*, *Fagopyrum*, *Polygonum*, *Phagopyrum*, *Rumex*, *Rheum*.

Polygonatum (Solomon's Seal), genus of herbaceous perennials (family Liliaceae) with handsome leafy stems and axillary bell-shaped flowers, followed by red or blue-black berries. *P. multiflorum*, *P. odoratum*, and *P. verticellatum* are Brit., and others are grown in gardens in Britain.

Polygonum, family Polygonaceae, genus of about 150 ann. and perennial herbs, of which *P. aviculare*, Knotgrass, *P. ratif*, Ray's Knotgrass, *P. persicaria*, Persicaria, *P. hydropiper*, Water-pepper, *P. convolvulus*, Black Bindweed, are ann.; and *P. maritimum*, Sea Knotgrass, *P. bistorta*, Bistort, Snake-root, Easter-ledge, *P. amphibium*, Amphibious Bistort, Willow Grass, are natives of Britain. *P. vacciniifolium* is a Himalayan border plant, and *P. affine* a rock plant of Nepal, grown with many others in gardens.

Polygyny, marriage of one man with more than one woman simultaneously. It is practised, as an ideal form of marriage, by most primitive peoples, and is commonest in the case of rich men or those of high status. It is associated with economic factors, in that an important man or chief may have to supply hospitality to many guests and clients, which necessitates many wives to prepare food, etc. In addition, it is a way of ensuring many sons from which suitable heirs may be selected. On the whole, the frequent accusation that it is mainly an institution to pander to lust is without foundation. It is practised in China, India, and Islamic countries—by Koranic law a man may have up to four wives. The Mormons of Utah practised P. until 1890, but the custom was later prohibited by the Utah constitution. See MARRIAGE; FAMILY; POLYGAMY.

Polyhedron (Gk *polus*, many; *hedra*, a base), in solid geometry a solid figure bounded by plane faces. Polyhedra are said to be regular when the faces are similar and equal regular polygons; there are 5 such forms, often known as Platonic solids. They are: (1) The regular *tetrahedron*, of which each solid angle is formed by 3 equilateral triangles; it has 4 faces, 4 vertices, and 6 edges. (2) The regular *octahedron*, of which each solid angle is formed by 4 equilateral triangles; it has 8 faces, 6 vertices, and 12 edges. (3) The regular *icosahedron*, of which each solid angle is formed by 5 equilateral triangles; it has 20 faces, 12 vertices, and 30 edges. (4) The cube, or regular *hexahedron*, of which each solid angle is formed by 3 squares; it has 6 faces, 8 vertices, and 12 edges. (5) The regular *dodecahedron*, of which each solid angle is formed by 3

regular pentagons; it has 12 faces, 20 vertices, and 30 edges. In polyhedra if V , E , and F are the numbers of vertices, edges, and faces, respectively, the relation $V - E + F = 2$ always holds. Thus in a cube, which has 12 edges and 6 faces, $V - 12 + 6 = 2$, or $V = 8$.

Polyhymnia, goddess of eloquence, vocal music, and mimicry. See **MUSES**.

Polymerism, term used in chem. to denote the phenomenon shown by those compounds that have the same empirical formulae but different molecular weights, those with the higher molecular weights being directly obtainable from those with the lower. Thus paraldehyde, $(C_2H_4O)_3$, is a polymer of acetaldehyde, C_2H_4O , since it has the same atoms in the same ratio, and is directly obtainable from acetaldehyde. Similarly benzene, C_6H_6 , is a polymer of acetylene, C_2H_2 . On the other hand, acetic acid, $C_2H_4O_2$, is not a polymer of formaldehyde, CH_2O , since, although it has the same atoms in the same ratio, it cannot be directly obtained from formaldehyde. Some polymers with very large numbers of atoms in their molecules ('macromolecules') are the basis of many modern synthetic fibres. Another, polyethylene (q.v.), is an excellent insulator. See also **PLASTICS**.

Polymethyl Methacrylate, see **PLASTICS**.

Polymyxins, see **ANTIBIOTICS**.

Polynesia is the name given to the 'many is.' of the E. Pacific, the area included forming roughly a triangle, with Hawaii in the N., New Zealand in the SW., and Easter Is. in the SE. Scattered widely over an ocean ter. 4 times the size of Europe, these is. are inhabited by a brown-skinned people whose origin remains an unsolved problem. For the people of Oceania did not grow there, they migrated to the is.; the Polynesians probably within our own Christian era. Controversy still rages as to whether they came from S. America westwards or from the Indies eastwards. Evidence suggests that it may have been a combination of both. Basically of Caucasian stock, they are a tall, well-built race with intelligent and often handsome features, speaking different dialects of the same Maori tongue. Little is known of their early hist. The recitation of genealogies was an estab. part of their culture, but human memory cannot be relied upon for more than a few hundred years, when fact becomes entangled with myth and legend. Much has been written of the Polynesians in their period of adventure and discovery. Using large double-canoes, without the help of modern navigational instruments, they colonised vast areas of the E. Pacific, some of their voyages extending over thousands of m. By about the 13th cent. the long voyages and migrations were ended.

European civilisation was brought to P. during the 16th and 17th cents. by the explorers of many nations, including the Spanish, Dutch, French, and British. Happy-natured and intelligent, the islanders came readily under the influence of the white man; but of late there has

been shown a tendency towards nationalism, especially in Samoa.

The is. themselves vary from high volcanic formations, such as Hawaii and Tahiti, to low coral atolls hardly above sea-level such as are found in the Tuamotu Archipelago, with many combinations of the two. The productivity of the is. varies accordingly, from the rich fertility of the high is. which bear all kinds of tropical fruits, to the barren atolls on which little but coconut trees can grow. The oldest and most valuable industry is the production of copra (the dried kernel of the ubiquitous coconut). See O. Fornander, *Origin of the Polynesian Nations*, 1885; J. M. Brown, *Maori and Polynesian*, 1907; T. R. St Johnston, *Islanders of the Pacific*, 1921; J. M. Brown, *People and Problems of the Pacific*, 1927; R. W. Williamson, *Religion and Social Organisation in Central Polynesia*, 1937; P. H. Buck, *Vikings of the Sunrise*, 1938; Sir H. Luke, *Britain and the South Seas*, 1945, and *From a South Seas Diary*, 1938-42, 1945; R. Gibbins, *Over the Reefs*, 1948; and T. Heyerdahl, *American Indians in the Pacific*, 1952; also *Pacific Islands Year Book*, and an excellent series of monographs on every aspect of P. pub. by the Bernice P. Bishop Museum, Honolulu. See also individual articles.

Polynices, son of Oedipus and Jocasta (q.v.), fled from Thebes to escape his brother Eteocles. Adrastus of Argos married his daughter Argia to him, and gathered the expedition of the Seven against Thebes (q.v.) to restore him. He fell in single combat with Eteocles. His body was left to the birds, but his sister Antigone (q.v.) buried it.

Polyp, a type of zooid in the phylum Coelenterata which is adapted for a sedentary mode of life. In general shape it is cylindrical and has a terminal 'mouth' surrounded by mobile tentacles. The other type of coelenterate zooid is the medusa, a free-living jellyfish organism adapted for a planktonic, freely-drifting existence.

Polyphemus, one-eyed giant, chief of the Cyclopes (q.v.), and son of Poseidon and Thoësa. He dwelt in a cave in SW. Sicily, and when Odysseus and his companions were wrecked there he imprisoned them and devoured many. Finally, Odysseus made him drunk and blinding him, escaped from the cave with his comrades by clinging to the sheep and goats as they were let out to pasture. A later story tells how P. loved Galatea, and killed her lover, Acis.

Polyphony, combination of 2 or more melodies or melodic strands in such a way that they make musical sense. It is essentially the same as counterpoint, but the latter term is used more specifically for the purely academic way of writing music of this kind for practice and study, whereas P. proper is its application to musical composition for artistic ends.

Ployploidy, see **VARIATION**, IN **BIOLOGY**.

Polypodium, a large genus of over 1100 species of ferns, chiefly evergreen, family Polypodiaceae, widely distributed through-

out the world; *P. vulgare*, Common Polypody, is the chief Brit. native.

Polyporus, a genus of Bracket or Shelf fungi, family Polyporaceae, producing fruit-bodies on trees, and causing heart-rot within.

Polypus (plural, Polypi), tumour possessing a stem, or *pedicle*, by which it is attached to a tissue surface. Polypi are usually found on mucous membranes, as in the nose, bladder, uterus, rectum, etc. The treatment in most cases is to remove them.

Polystichum, Shield Fern, family Polypodiaceae, genus of about 225 species, cosmopolitan in distribution; of which *P. lobatum*, Hard S. F., *P. setigerum*, Soft S. F., and *P. lonchitis*, Holly Ferns, formerly of the genus *Aspidium*, are natives of Britain.

Polystyrene, see PLASTICS.

Polythalamia (Gk *polus*, many; *thalamos*, chamber), term applied to those species of marine foraminiferan protozoans which are many-chambered. The term is used in opposition to Monothalamia, containing the single-chambered species.

Polytheism (Gk *polus*, many, and *theos*, god), belief in many gods, as opposed to monotheism and atheism. Some authorities hold that it is a degradation of monotheism, others that it preceded monotheism in the evolution of religion (q.v.).

Polytonality, system of musical composition of the 20th cent., the principle of which is that music may be written in several keys at once.

Polytrichum, genus of acrocarpous mosses. *P. commune*, a handsome moss with almost woody stems, occurs on heaths and moors.

Polyvinyl Chloride, see PLASTICS.

Polyzoa, or Bryozoa (moss animals), group of plant-like animals, which, with the exception of a single genus, form colonies, which arise by the continual budding of the cells. The majority are marine, but many occur in fresh water. The colonies exhibit wide variation in form and habit, occurring as crusts on rocks, as masses, broad fronds, branched growths, etc., and the texture and consistency may be gelatinous, horny, and flexible, or stony. Many are of great beauty. A typical form is *Flustra foliacea*, the broad-leaved hornwrack or sea-mat, common in heaps of seaweed cast up on sandy Brit. coasts. Its brown horny fronds branching from a narrow flat stem are reticulated with little oblong boxes or cells (zoecia) through a lid in which a coronet of tentacles emerges to set up currents which convey food to the mouth. Reproduction is by means of eggs which hatch into ciliated embryos, each of which after a few hours' free swimming settles down and by budding gives rise to a new colony. An example of a fresh-water species is *Plumatella repens*.

Polzin, see POLCZYN ZDRÓJ.

Pomaria, see TLEMCEN.

Pome, in botany, a succulent, many-celled fruit, composed of a firm, fleshy receptacle enclosing carpels and seeds forming the core, e.g. apple.

Pomegranate (*Punica granatum*), handsome deciduous tree (family Puniceae). Though a native of Persia, it is often grown in the open in Britain for the beauty of its scarlet flowers. The tree is sufficiently hardy for ornament, but unless protected does not produce the reddish yellow fruit, the seeds of which are eaten. Various parts of the tree have medicinal value. See BALANSTA.

Pomerania (Ger. Pommern), former ter. of Germany and maritime prov. of Prussia (q.v.), lying on the S. shore of the Baltic, and bounded E. by W. Prussia, W. by Mecklenburg, and S. by Brandenburg (qq.v.). The Oder (q.v.) divided it into Hinterpommern (in the E.) and Vorpommern (in the W.). After the Second World War Hinterpommern was incorporated in Poland (see POMORZE), and Vorpommern became part of the Land of Mecklenburg. P., which once included also W. Prussia, was a sovereign duchy until 1637, when its dynasty became extinct. In 1648 the treaty of Westphalia (q.v.) gave Hinterpommern to Brandenburg, and Vorpommern to Sweden. In 1720 part of Vorpommern came into the hands of Prussia, and the remainder passed to Denmark in 1815 (when Norway was exchanged for Sweden's Ger. ter.). The prin. tns of P. were the cap. Stettin (now Szczecin), Köslin (now Koszalin), and Stralsund (qq.v.). In the Second World War the Russians under Marshal Zhukov crossed into P. on 28-31 Jan., 1945. Szczecin fell on 28 Feb. The Russians reached the Baltic at Kolberg (Kolobrzeg) on 4 Mar. but that tn did not fall until 18 Mar. The advance in P. was delayed by the tenacious Ger. resistance at Königsberg (E. Prussia), which was not taken until 9 April. Thereafter the Russians advanced to the Oder. Szczecin was occupied on 26 April. R.A.F. attacks on the flying bomb and rocket experimental station at Peenemünde (and others) delayed the launching of the robot offensive by 6 months. Area 14,827 sq. m. See EASTERN FRONT or RUSSO-GERMAN CAMPAIGNS IN SECOND WORLD WAR.

Pomeranian Dog, common in many parts of Europe, especially Germany, where it is known by the name of 'Spitz'. The Germans claim it as one of their national breeds, and it is certain that it is a N. or Arctic breed. The P. D. became popular in England during the latter half of the 19th cent., owing to its being a favourite with Queen Victoria. It is a well-knit dog, with fox-like face and head, small erect ears, and intelligent expression. It may be either pure white, black, or brown. The early type weigh from 20 to 25 lb., but through the exertions of breeders many now weigh under 8 lb. Toy Poms have been growing in popularity during the last 30 years.

Pomerellen, see POMORZE.

Pomeroy, par. and vil. of co. Tyrone, N. Ireland, 8 m. NW. of Dungannon. A local industry is coffin-making. Pop. 400.

Pometinae Paludes, see PONTINE MARSHES.

Pommern, see POMERANIA.

Pomona (*Pomorum Patrona*), Rom. goddess of fruit trees. See Ovid, *Metamorphoses*, xiv. 623; Propertius, iv. 2.

Pomona, see MAINLAND.



POMERANIAN DOG

T. Fall

Pomona, city and health resort of Los Angeles co., California, U.S.A., in the San Bernardino valley, 2 m. from Spadra, with extensive fruit, vegetable, and wine industries, dairying, the manuf. of clay, metal, and paper products, and oil refining. P. College (opened in 1888) is near by. Pop. 35,400.

Pomorze (Ger. Pomerellen), ter. in NW. Poland, comprising the E. part of Pomerania (q.v.). After the First World War it formed part of the Polish Corridor (q.v.). In 1945, on the incorporation of Pomerania in Poland, a new voivodship of P. was created by the addition of adjoining dists. to the S. part of the Corridor. In 1949 this voivodship was renamed Bydgoszcz (q.v.).

Pompador, Jeanne Antoinette Poisson, Marquise de (1721-64), mistress of Louis XV, b. Paris. The king estab. her at Versailles in 1745 and bought her the estate of P., from which she took her title. Here she at once became the leader of a brilliant artistic and literary circle, amongst whom figured Voltaire, Quenoy, Boucher, Vanloo, Greuze, and many other noted men. She became the patroness of learning and arts, and soon turned her attention to state affairs as well, filling the most important offices with her favourites, and making and unmaking, by turns ministers, diplomats, and generals. No one obtained office except through her, and, like Mme de Maintenon, she prepared all business to come before the king with the ministers. An Eng. trans. of her letters from 1753 to 1762 was pub. in 1771. See J. B. Capefigue, *Mme la Marquise de Pompador*, 1858; H. Bonhomme, *Mme de Pompador, général d'armée*, 1880; P. de Nolhac, *La Marquise de Pompador*, 1903; life by A. Leroy, 1938; and study by D. R. Wyndham Lewis in *Four Favourites*, 1948.

Pompeia, third wife of Julius Caesar, to whom she was married in 67 BC, and

granddaughter of Sulla. Clodius had an intrigue with her, and when in 61 his presence was discovered in Caesar's house during the celebration of the mysteries of the Bona Dea, Caesar divorced P. (61). See Suetonius, *Caesar*, vi.

Pompeii, anct. tn of Campania in Italy, 2 m. from the shore of the bay of Naples and situated at the foot of Mt. Vesuvius. Very little of its hist. is recorded before 79 BC. It was not originally a Gk colony. According to Strabo, it was first occupied by Oscans, afterwards by Etruscans, and lastly by Samnites; it was one of the last places in Campania to be reduced by the Romans. A military colony was settled there and the pop. rapidly became romanised. P. grew into a fashionable place for Rom. nobles, who possessed villas in the neighbourhood. It took a prominent part in the Social war (91-89 BC), and withstood a siege by Sulla. The industrial part of the pop. was chiefly employed in wine-making and manufacturing millstones out of lava. In AD 63 an earthquake destroyed a large part of the tn, and the inhab. were actively repairing and rebuilding their city when the whole place was overwhelmed by the great eruption of Vesuvius on 24 Aug. AD 79. The city was entirely buried by cinders, stones, and ashes, and over 2000 persons perished. The younger Pliny gives a description of the eruption, but not of the destruction of the tn, although his uncle perished there. During the Middle Ages the very site of the city was forgotten; vineyards and mulberries grew over the ground and obliterated all that was left. In 1594, during the construction of an underground aqueduct, 2 inscriptions were found, and a little inspection proved the fact that the ruins of a considerable place lay buried in the soil. In 1763 systematic excavations were commenced. Since 1861 the It. Gov. has carried forward the work on a system devised by G. Fiorelli, and the greater part of the whole tn has now been unearthed. The chief buildings of interest are the great amphitheatre to seat 20,000 persons, one of the finest that has been discovered; the forum, with the public buildings on all sides of it; the paved way to the forum, which was for foot passengers only and adorned with many statues; the temples of Jupiter, of Apollo, of Isis and Zeus Milichus, of Vespasian and Fortuna Augusta, and the Doric temple which stands in another forum with a large and a small theatre adjoining, and 3 separate estabs. for public bathing, with the complete apparatus for hot and cold water, etc. Joining the theatres were the barracks of the gladiators, where objects of personal use were discovered just as they were left on the day of destruction. The streets with their shops and houses have now been unearthed, and among the most interesting of these are the house of the Vettii, the house of the Faun, and the mansion of Sallust, etc. In the Street of Abundance, one of the wine-sellers' shops contained all the vessels and pots and pans for daily use in good preservation. The private build-

ings are of great interest because of the light they throw on the domestic side of Gk and Rom. life at that period. Of the numerous objects of art found, many are very beautiful, though inferior to those found at Herculaneum, and some of the green bronze statuettes are of exceptional workmanship, among them the dancing Faun and that called the youthful Bacchus or Narcissus. Many of the mural paintings and fresco works are of high artistic excellence. The mosaics especially call for attention. The most complete and beautiful was found in the house of the Faun, representing Alexander at the battle of Issus, now in the museum at Naples, where practically all of the movable artistic objects were placed. Great care has been taken to preserve the remains of the upper storeys, with their balconies and pillared openings, and these assist largely in giving a true picture of the architecture and house-planning of the time. The volcanic matter that buried the city and suffocated the people as they tried to escape preserved the very forms of the men and women, whose bodies were practically moulded into the mixture of ashes and cinders that later formed a plaster to preserve the very attitudes and costumes in which the people died. The house of the Vettii has been restored as far as possible to show the actual conditions in which the wealthier classes of P. lived at that time. Excavations in 1921 on the N.E. side disclosed, among the more interesting objects, sev. fine paintings, including a large one of the 12 custodians or penates of P.; a house with the remains of a balcony on the first floor; a bar or thermopolium; and 2 beautiful porticoes, almost intact, and a pergola above 4 shops. These pictures were discovered at the *compita*, i.e. street-crossings, which were held sacred and generally marked with sacred pictures and an altar. Below one such *compitum* was found an altar of masonry, built into the wall, on which were still preserved the ashes of the last sacrifice that was held before the fatal hour. The bar is interesting for its many terra-cotta amphorae found still fixed in the ground and for its furnace situated at the end of the counter. Above the furnace was found a cauldron in which remained some liquid placed there on the day of the catastrophe. This bar was no doubt much resorted to, because on its walls were found many election manifestoes, one being on behalf of a man named Lollius, and between each letter of his name were smaller letters announcing that he was a *duumvir* who looked after the streets and the sacred buildings. The pergola is situated above 4 shops, and is almost intact. In the entrance to one of the shops were found the remains of a little staircase leading up to the pergola.

Another well-preserved building has a fine crypto-portico of 3 long corridors facing on to a garden. The walls of these corridors still retained their decorations, which take the form of imitation encrusted

marble slabs dating from the 2nd cent. bc. During excavations in 1941 some 465 inscriptions, figures, and sketches on the columns of the palaestra (gymnasium) were discovered. At the same place the excavators found the skeletons of 85 people killed or hurried by volcanic debris while fleeing for safety. Near these remains was also found a case containing surgical instruments for oculistic operations, sev. of them in a very good state of preservation. P. was bombed in the Second World War and damage was done, especially in the area of Nuovo Scavi. Excavations during the year 1956-7 concentrated on an area close to the Porta Nocera. Here were discovered the petrified bodies of a man and woman lying as they fell when overtaken by the lava. The remains of a tavern were also uncovered; near by was found the statue of a gladiator, which is believed to have been used as the tavern sign and is the first figure of its kind unearthed at P. See R. C. Carrington, *Pompeii*, 1936; E. C. Corti, *The Destruction and Resurrection of Pompeii and Herculaneum*, 1951.

Pompeius Magnus (Pompey the Great), Gnaeus (106-48 bc), Rom. gen. and statesman; son of Gnaeus Pompeius Strabo, under whom he fought against the Italians in 89. He also distinguished himself as one of Sulla's lieutenants (84-82). In 81 he fought a successful campaign against the Marian leaders in Africa, and was honoured by Sulla on his return with the surname *Magnus*. From 76 until 71 P. was in Spain helping to put down the rebellion of Sertorius. In 70 he was consul with M. Crassus, and it was at this time that his sympathies veered from the aristocratic to the popular party. Three years later the *Lex Gabinia* gave him supreme command in a war against the Mediterranean pirates, whom he cleared from the sea within a space of 3 months. In 66 the *Lex Manilia* entrusted P. with command in the second Mithridatic war. Having defeated Mithridates, he estab. the prov. of Asia (64), took Jerusalem in the following year, and, after settling the affairs of Asia, returned to Italy in 62. The senate's refusal to ratify his Asiatic settlement led him to form the first triumvirate with Caesar and Crassus (qq.v.); and to cement this union Caesar gave P. his daughter Julia in marriage (59). But Caesar's subsequent success in Gaul was fatal to P.'s supremacy at home, and their alliance became no more than nominal. The death of Julia in 54 and that of Crassus at Carrhae in 53 further loosened the bonds. P. now aimed at dictatorship, and by encouraging civil strife secured his appointment as sole consul in 52. Soon afterwards he became reconciled to the aristocracy, who thenceforward regarded him as their leader. In 49 civil war broke out. The decisive battle of Pharsalus (48) ended the career of P. He fled to Egypt, but while landing was stabbed to death by order of the ministers of Ptolemy XIII. See Sir Charles Oman, *Seven Roman Statesmen*, 1902.

Pompey's Pillar, fine monolith of red granite erected in the Serapeum at Alexandria in Egypt to commemorate the emperor Diocletian's remission of part of the corn tribute after his overthrow of Domitian, AD 296. It took its name through its site being confused with that of Pompey's tomb.

Pompoano, see LAGNY.

Pom-Pom, name first given during the S. African war to a large-calibre Maxim quick-firing gun used by the Boers. Two-pound P.-P.s were first mounted in destroyers in 1913. After the First World War multiple-barrelled P.-P.s were developed as part of the close-range anti-aircraft armament of Brit. ships, each barrel firing 200 rounds per min. The Bofors (q.v.) 40-mm. quick-firing gun has succeeded the Maxim.

Pomponius Atticus, see ATTICUS.

Pomuk, John of, see JOHN, St.

Ponape, see CAROLINE ISLANDS.

Ponca City, city of Kay co., N. Oklahoma, U.S.A., near Arkansas R. It is a manufacturing and trade centre for an oil-producing, agric., stock-raising, and dairying area. It has large oil refineries and grain elevators, and manufs. packed meat, dairy products, flour, feed, steel tanks, metal products, aeroplanes, clothing, and mattresses. To the S. is Lake Ponca, 5 m. long. Pop. 20,180.

Ponce (so called after P. de León), seaport 45 m. SW. of San Juan, on the S. of the is. of Puerto Rico. It is the centre of a dist. growing sugar cane, coffee, and fruit; cattle raising, alcohol and rum distilling, sugar refining, brewing, fruit canning, and dairying are also carried on. Cotton and rayon textiles, straw hats, needlework, candy, and shoes are manufactured. It is a port of entry. P. has a fine harbour and a cathedral. Pop. 99,500.

Ponce de León, Juan (1460-1521), Sp. explorer, *b.* Servas, León. He accompanied Columbus on his second voyage, in 1493, and was appointed lieutenant to the governor of Hispaniola. In 1508, having received intelligence from the natives that the neighbouring is. of Boriquen, or Puerto Rico, abounded in gold, he succeeded in conquering it after many hard-fought battles, but was superseded in the command of the conquered country. The Sp. consul of the Indies in 1509 appointed P. de L. governor, and later 'captain,' of the is. of San Juan (i.e. Puerto Rico), but Diego Columbus (son of Christopher) protested against this appointment as an infringement of his rights. He next appears to have conceived the idea that there was yet a third world to be discovered; but he decided to sail first to a certain is. of the Bahama group, called Rimini, where, according to a tradition, there was a fountain possessing the power of restoring youth. He did not, however, discover either the is. or the fountain, but came in sight of what he supposed to be an is., which he called Pascua Florida. P. took possession of the country in the name of Ferdinand and Isabella. In a subsequent expedition

he came upon the W. coast of Florida, where he made a descent, but was fatally wounded by the Indians. P. de L. was the first early governor of the new Sp. colonies to be promoued by the crown the title of *adelantado*, an old one belonging to the medieval polity of Castile. See C. H. Haring, *The Spanish Empire in America*, 1947.

Poncelet, Jean-Victor (1788-1867), Fr. mathematician. He held a commission in the Fr. Army and was taken prisoner by the Russians during Napoleon's retreat from Moscow. While in prison he formulated the theory of projective geometry which was first published as *Traité des propriétés projectives des figures*, 1822.

Ponchielli, Amilcare (1834-86), It. composer, *b.* near Cremona, studied at the Milan Conservatory in 1843-54. In 1856 he succeeded in producing his first opera, *I promessi sposi*, based on Manzoni's famous novel, at Cremona; a revised version came out at Milan in 1872. After 2 ballets and 3 more operas came the one opera by which he now survives, *Gioconda*, based on Victor Hugo's *Angelo*, produced at the Milan Scala in 1876. The last of 3 further operas, *Marion Delorme*, 1885, was also derived from a Hugo play. See lives by G. de Napoli, 1936, and A. Damerini, 1940.

Poncho, sort of cloak with a hole for the head, worn by the Indians of S. America, and also by many of the Sp. inhab. It resembles a narrow blanket with a slit in the middle through which the head passes, so that it hangs down loosely before and behind, leaving the arms free.

Pond, John (1767-1836), astronomer, *b.* London, became Astronomer Royal in 1811. He revolutionised almost all the methods of observation by availing himself of mural circles and reflected vision. Not only was the equipment at the Royal Observatory completely changed; the number of assistants was also increased from 1 to 6.

Pondichery, or Pondicherry, former cap. of Fr. India, now tn of Madras state, India. It lies on the Coromandel coast, 122 m. by rail S. of Madras. The tn, which is well laid out, and which draws its water supply from artesian wells, was founded in 1674. After Kyre Coote captured P. from Lally in 1761, it was many times temporarily in the hands of the Eng. At P. was the residence of the governor of the colonies. One senator and one deputy represented the colonies in the Parliament. During the Second World War P. declared for Gen. de Gaulle and was used as a base for allied operations against Japan.

Pondoland, so called from a Kaffir people, the Pondo, lies NE. of Tembuland, between the Indian Ocean and the Kwanthlamba Mts. in S. Africa. P. was annexed to the Cape Colony in 1894, but is now part of the Transkei Ter. (q.v.). The vegetation is luxuriant. Pottery, basket-work, and wood-work are the best industries. In 1930 P. instituted its own agric. training school at Flagstaff. The school is now under the United Transkeian

Ters. Council. Area 3918 sq. m. Pop. 240,000. See M. Hunter, *Reaction to Conquest*, 1936.

Pondweed (*Potamogeton*), cosmopolitan genus of floating or submerged plants (family Potamogetonaceae) with leathery leaves and spikes of small green flowers. *P. lucens*, Shining P., *P. natans*, Broad-leaved P., *P. polygonifolius*, Bog P., *P. nodosus*, Loddon P., *P. perfoliatus*, *P. crispus*, Curled P., *P. obtusifolius*, Grassy P., and *P. compressus*, Grasswrack P., are found in Britain.

Ponsonby, Sarah, see BUTLER, LADY E.

Ponsonby, Vere Brabazon, see BESSBOROUGH, NINTH EARL OF.

Ponsonby of Shulbrede, Arthur Augustus William Harry Ponsonby, first Baron (1871-1946), author and politician, educ. at Eton and Balliol College, Oxford. Entering the diplomatic service in 1894, he was abroad for 3 years and at the Foreign Office from 1899 to 1902. In 1908 he was elected Liberal M.P. for Stirling. His political life was governed by his efforts for peace, and his advocacy of a negotiated peace during the First World War lost him his seat in Parliament in 1918. He became Labour M.P. for Brightside (Sheffield) in 1922, and held office during the Labour Govs. of 1924 and 1929, being raised to the peerage in 1930. Following differences over foreign policy, he resigned from the Labour party in 1935 and devoted himself to the activities of the Peace Pledge Union. As a literary historian he made a close study of diaries written since the 16th cent., and the results of his researches were pub. in *English Diaries*, 1923, *More English Diaries*, 1927, and *Scottish and Irish Diaries*, 1927. His political writings include *The Decline of Aristocracy*, 1912; *Democracy and Diplomacy*, 1915; *Wars and Treaties, 1815-1914*, 1917; *Now is the Time*, 1925; he also wrote a life of his father (1942). His personal beliefs were expressed in *Life Here and Now*, 1936.

Pons-Winnecke Comet, see COMET.

Pont-a-Mousson, Fr. tn in the dept of Meurthe-et-Moselle, on the Moselle. It has many historic buildings and was damaged in both World Wars. There are ironworks, and machinery is manuf. Pop. 10,200.

Pont du Gard, see GARD, PONT DU.

Ponta Delgada: 1. Administrative dist. of the Azores (q.v.), comprising the is. of São Miguel and Santa Maria. Area 325 sq. m. Pop. 176,000.

2. Largest city (but not the cap.: see ANGRA) of the Azores, cap. of P. D. dist., situated on the S. shore of São Miguel Is., 900 m. W. of Lisbon. It has an excellent harbour, is a port of call for transatlantic steamers, and is the commercial centre of the Azores, with a trade in fruit, wine, cereals, vegetables, sugar, tea, tobacco, sperm-whale oil, and chicory. Pop. 22,700.

Ponta Grossa, tn of Brazil, in Paraná state, 200 m. from São Paulo. It is a communications centre for its dist., and produces beef, pigs, tobacco, rice, and bananas. A great deal of timber and

yerba maté from P. G. is exported from Paranaguá (q.v.). Pop. 44,125.

Pontarlier, Fr. tn, cap. of an arron., in the dept of Doubs, on the Doubs. It is a railway junction, and manufs. foodstuffs, hardware, and leather goods. Pop. 12,900.

Ponte, Giacomo da, see BASSANO.

Pontefract, or **Pomfret**, tn and bor. constituency in the W. Riding of Yorks, England, 13 m. S. of Leeds, near the junction of the Rs. Aire and Calder. There are ruins of the Norman castle (founded in 1069), where Richard II and Earl Rivers were put to death. The first bor. charter was granted at the end of the 12th cent. by Robert de Lacy, a descendant of the man who received the honour of P. from William the Conqueror. Coal mining is the prin. industry, and there are tanning, brewing, corn-milling, iron-founding, motor engineering and transport, and furniture-making in the vicinity. Liquorice is still grown in large quantities for the famous 'Pontefract' or 'Pomfret' cakes. Pop. 23,800.

Pontevedra: 1. Sp. prov., in Galicia (q.v.). It has a heavily-indented coastline on the Atlantic, and is separated from Portugal on its S. frontier by the Miño (q.v.). The region is mountainous and is thickly populated, the inhab. living mainly by agriculture and fishing. The chief port is Vigo (q.v.). Area 1695 sq. m. Pop. 679,300.

2. (Rom. *Ad Duo Pontes*, later *Pontis Veteris*) Sp. tn, cap. of the prov. of P., in a flood at the mouth of the Lerez. It has a fine 16th-cent. cathedral in florid Gothic style, other old churches, and a 13th-cent. episcopal palace. P. has a naval radio station, and a trade in agric. produce, wine, textiles, and pottery. Pop. 43,950.

Pontiac (c. 1712-69), chief of the Ottawa Indians, and reputed engineer of a vast conspiracy in 1763 against the English at Detroit, Fort Pitt (Pittsburgh), and in the country between. With the help of the Wyandot, Potawatomi, Ojibwa, and other tribes he captured many forts, arranged successful ambushes, and slew and captured many English. In 1766 he yielded, and 3 years later he was assassinated in Illinois by one of his own race. P. possessed a faculty for organisation rare among his race. He and his friends had been allies of the French in the long struggle with the British for possession of Canada and the W. After the French were beaten P. retained all his hostility to the British. His plan was nothing less than to drive them all E. of the Alleghonies. See F. Parkman, *The History of the Conspiracy of Pontiac*, 1851, and H. H. Peckham, *Pontiac and the Indian Uprising*, 1947. R. G. Adams's article in *Dictionary of American Biography*, vol. xv, 1935, is at variance with this.

Pontiac, city, cap. of Oakland co., Michigan, U.S.A., 26 m. NW. of Detroit, in farm, lake, resort area. It manufs. automobiles, trucks, buses, and rubber products. Pop. 73,700.

Pontias, see PONZA.

Pontian, Saint (d. c. 236), succeeded St Urban I as Pope about 230. Five years later he was exiled to Sardinia by the emperor Maximinus, and is said to have d. from ill treatment.

Pontianak, port on the Kapuas, on the SW. coast of Indonesian Borneo. It exports timber, copra, rubber, and palm oil. Pop. 46,000.

Pontifex (Lat. *pons*, bridge; *facere*, to make; Eng. Pontiff), member of the chief sacred college in anc. Rome, at whose head was the *pontifex maximus* (high priest). Until the days of Sulla, when the number was raised to 16, the college had 9 members (4 patrician and 5 plebeian), elected at first by co-optation, but after 103 BC by the *comitia tributa*, under the presidency of a pontiff. The college supervised religion, and was the last court of appeal when any religious dispute arose. It further possessed considerable political power through its control of the calendar and its power to intercalate days and regulate festivals. The *pontifex maximus* chose the flamines, vestals, and the *rex sacrorum*. From Augustus onward the Rom. emperors assumed his functions and title. The title has since been used by the Popes.

Pontifical, liturgical book for the use of bishops in the Rom. Catholic Church, containing prayers and rubrics for episcopal ceremonies other than the Mass. Books of this nature are found as early as the 8th cent. The *Pontifical Romanum* appeared in 1485. See P. de Puniet, *Pontifical Romain*, 1931.

Pontine Islands, see PONZA.

Pontine Marshes (It. *Paludi Pontine*; anc. *Pometinæ Paludes*), stretch of ter. in Lazio (q.v.), Italy, extending for about 80 m. along the coast of the Tyrrhenian Sea between Velletri and Terracina (q.v.). They are crossed by the Applan Way (q.v.), and were formerly notoriously unhealthy. As early as 312 BC Appian Claudius (q.v.) attempted to drain the marshes, and further efforts were made by Augustus, Trajan (q.v.), and many of the Popes. Eventually, in 1926, the It. Gov. began extensive modern drainage schemes; the reclaimed land has been cultivated, and sev. new tns founded on it.

Pontis Veteris, see PONTEVEDRA.

Pontius, Gavius, Samnite gen. who in 321 BC defeated the Rom. army at the Caudine Forks.

Pontius, Paul (b. 1596 or 1603), Flem. engraver, famous for his reproductions of the pictures of Rubens and the portraits of Van Dyck.

Pontius Pilate, Rom. procurator of Judaea, a Roman of the equestrian order appointed to his office by Tiberius in AD 26. Under him in c. AD 33 Christ was crucified. Recalled in AD 36, after endless quarrels with the Jews, and riots culminating in a brutal suppression of a Samaritan rising, he is reported by Eusebius to have taken his own life at Vienne in Gaul, the scene of his banishment. Coptic tradition, however, says he was martyred as a Christian, and he is claimed as a saint by

the Ethiopian Church. Authorities for P. P.'s life are the N.T., Eusebius, Josephus, and Philo. See M. Radin, *The Trial of Jesus of Nazareth*, 1931; A. V. Jüchen, *Jesus und Pilatus*, 1941; K. L. Schmidt, *Der Todesprozess des Messias Jesus*, 1945; and C. M. Franzén, *The Memoirs of Pontius Pilate* (novel), 1945.

Pontius Pilate's Bodyguard, see ROYAL SCOTS.

Pontivy, tn in the dept of Morbihan, France, 29 m. NE. of Lorient. The tn, which is on the R. Blavet and the Nantes-Brest canal, grew up around a 7th-cent. monastery. The newer portion was formerly called Napoléonville. Manufs. are linen, paper, and agricultural requisites. Pop. 10,900.

Pontoise, Fr. tn, cap. of an arron., in the dept of Seine-et-Oise, at the confluence of the Viosne and the Oise. It has flour-mills, and makes boats. Pop. 11,000.

Pontoon (card game), see VINGT-ET-UN.

Pontoon signifies a floating dock or, more strictly, a floating bridge. The floating bridge has been used for military purposes from very anc. times, early examples being that thrown across the Bosphorus by Darius, and the one formed by Xerxes over the Hellespont, of which Herodotus has given a full description. In more recent times they were much used by Marlborough in his campaigns. Military P.s in the 20th cent. were generally constructed to float on cylindrical floats of tin or copper. The Germans used rubber P.s during the Fr. 1940 campaigns in the Second World War. Later, P.s were often replaced by the Bailey bridge. For a description of floating docks, see DOCK, *Floating Docks*.

Pontoppidan, Henrik (1857-1943), Dan. novelist and poet, b. Fredericia; he studied mathematics and physics at Copenhagen Univ. In his 3 novels, *Muld*, 1891; *Det Forjættede Land* (The Promised Land), 1892; and *Domnens Dag*, 1895, which together give a life-hist. of a minister who weds a peasant wife, he draws with remarkable force an intimate and sympathetic picture of country folk, though his work is coloured by extreme pessimism and bitterness. The cycle *Lykke-Per* (8 vols.), 1898-1904, describing Dan. tn life round 1900, is equally ironical and disillusioned. Both Georg Brandes and Goldschmidt had an important influence in his works. His early realistic tales of Dan. peasant life have probably never been equalled. In 1917 he and Gjellerup gained the Nobel prize for literature. See P. C. Andersen, *H. Pontoppidan*, 1934; C. M. Woolf, *H. Pontoppidan* (2 vols.), 1945.

Pontormo, Jacopo da (1494-1557), It. painter, b. Pontormo. He belonged to the Florentine school. He had great technical ability and is noted for frescoes at the Medicean villa at Careggi. Bronzino (q.v.) was his pupil.

Pontremoli, It. tn, in Tuscany (q.v.), 27 m. NW. of Massa (q.v.), on the Magra. It has a 16th-cent. cathedral, and cement, macaroni, and tanning industries. Pop. 3900.

Pontresina, vil. 3 m. SE. of St Moritz, Upper Engadine, Switzerland. It has a station on the Rhaetic railway which goes over the Bernina pass, and is both a summer and winter resort. Pop. 1000.

Pontus, most NE. dist. of Asia Minor, along the coast of the Euxine. It first acquired political importance through the foundation of a new kingdom, about the beginning of the 4th cent. BC, by Ariobarzanes I. This kingdom reached its greatest height under Mithridates VI (q.v.), who for many years carried on war with the Romans. In AD 62 the country was constituted by Nero a Rom. prov.

Pontus Euxinus, see BLACK SEA.

Pontypool, urban dist. and industrial tn of Monmouthshire, England, 8 m. N. of Newport, with manufs. of iron ware, tinplate, nylon yarn, glass, and soft toys. The first tin-plate to be made in Britain was produced here in 1703. It is on the border of the S. Wales coalfield. There are nine urban areas in P., Varteg, Garddiffeith, Abersychan, Pontnewnydd, P. tn, Pontymoel, Griffithstown, New Inn, and Sebastopol. Pop. 42,320.

Pontypridd, urb. dist. and mrkt tn of Glamorgan, Wales, situated at the junction of the Rs. Taff and Rhondda. It is an important centre for the inhab. of the 2 Rhondda valleys, the Taff Valley, and a considerable surrounding area. The tn is industrial in character, but possesses pleasing residential areas, and the spacious and well-known Ynysangharad Park. There are chain and cable works, and iron and brass foundries. Lying 2 m. from the centre is the Treforest Trading Estate, comprising 70 factories laid out on modern lines. The 'Old Bridge,' from which the tn takes its name, was erected in 1755, and is still one of the largest single-span bridges in the Brit. Isles. The council owns transport (including trolley vehicles), refuse destructor, open-air swimming-bath, parks, libraries, and public offices, and controls a crematorium, which was one of the first to be provided in Wales. Pop. 33,622.

Pony, see HORSE.

Ponza (anc. Pontiae), chief of the Pontine Is. (It. *Isole Pontiane*), a group of small is. lying in the Tyrrhenian Sea (q.v.), 65 m. W. of Naples (q.v.). It has a good harbour. Pop. 4000.

Ponziane, Isole, see PONZA.

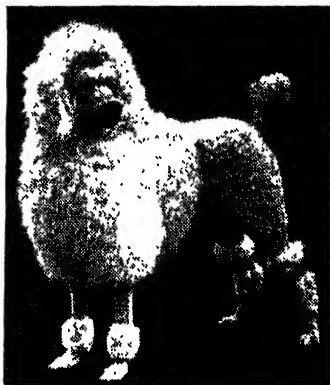
Pood, see METROLOGY.

Poodle, breed of dogs which first appeared in the 17th cent. P.s are usually jet black, like the Russian, or pure white, like the Ger., but modern breeders have introduced other shades. Their coat is a mass either of short curls or long ropy ringlets. The eyes are dark, bright, small, and full of intelligence; the muzzle is square, long, and not 'snipy'; the skull is broad and high with a well-developed brow; the ears are low-set, long, and close to the cheek, and the body is lifted well above the ground. The weight varies from 20 to 60 lb. The P. is remarkably sagacious. It is frequently clipped or trimmed, and its flesh is often left bare even in winter, except for a few

fringes and tufts on the ears, tail and shoulders.

Pool, see BILLIARDS.

Poole, or **Pole**, Matthew (1624-79), biblical commentator, of Emmanuel College, Cambridge, in 1649 incumbent of St Michael le Querne, London. In 1662 he was ejected for refusing to subscribe to the Act of Uniformity. His *Synopsis criticorum biblicorum* (5 vols., 1669-76) is a learned digest of all the exegetical works he had read.



POODLE

T. Fall

Poole, seaport and bor. constituency with oyster beds, 5 m. W. of Bournemouth, in Dorset, England. There is trade in potter's clay, tiles, bricks, sanitary pottery, chemicals, rope, and sailcloth; there is also engineering and boat-building and repairing. P. is a holiday resort, and P. Harbour, a stretch of water 7 m. long containing Brownsea Is., is a favourite yachting centre. Pop. 82,958.

Poole Dinding, see DINDINGS.

Pools, Football, ready-money betting by post on Eng. and Scottish football results, conducted by sev. promoters registered under the Pool Betting Act, 1954, who are responsible to an accountant duly appointed by the local authority. Total stake money, in respect of which a 30 per cent duty was paid in the year 1955, amounted to nearly £68m. Some promoters apply a limit to any individual prize. Summer pools are generally based on Australian football.

Poon Wood, name given to the wood of *Calophyllum tynophyllum* and other species. It is used for masts and spars.

Poona, city of Bombay State, India, 119 m. SE. of Bombay. P. became the Mahratta cap. in 1750. It was occupied by Wellesley in 1802, and ceded to the British in 1817, after the battle of Kirkee. P. is situated nearly 2000 ft up on the W. Ghats and under Brit. rule was hot-weather headquarters of the Gov. of

Bombay. There is a considerable military cantonment and an important Agric. College. A landmark to the S. of the city is Parbati Hill, on which, among others, is a fine temple dedicated to Parbati.

Poopó: 1. Lake of Bolivia connected with Lake Titicaca by the Desaguadero R. It is situated 185 m. SE. of Lake Titicaca, but is 500 ft lower. Its normal area is 400 sq. m. Old cartographers call it Pampa Aullagas.

2. W. Bolivian prov. Pop. 15,000.

Poor Clares, see CLARE, St.

Poor Law, History of. In the Middle Ages alms for the poor were dispensed by the Church. After the dissolution of the monasteries this source of charity diminished. Although poverty had always been a social problem, it assumed more serious proportions in early Tudor times, when soldiers disbanded after the Wars of the Roses and arable farm workers, thrown out of work by the enclosure of land given over to sheep, swelled the growing army of 'beggars coming to town.' It was recognised even in the brutal and robust times of Henry VIII that the hounding from par. to par. of vagabonds and the whipping of 'sturdy beggars' would not remove the evils of unemployment. Some of the larger towns began their own schemes of poor relief, which included the provision of work for able-bodied paupers. An Act of 1536 directed the head officers of towns to relieve the impotent poor and to set and keep vagabonds and beggars at continual labour. The money for these purposes was raised by voluntary contributions. This voluntary system was continued by an Act of 1552 which provided that a register of the poor should be kept and parishioners 'gently exhorted and admonished' to contribute according to their means. As the voluntary principle was unsuccessful, Acts of 1563 and 1597 empowered justices to exact compulsory levies, although there was no regular source of revenue for poor relief, or systematic relief of destitution, or provision of employment for the able-bodied poor. The Poor Law Act of 1601 for the first time regularised the Eng. poor-law administration financed by rates compulsorily levied on occupiers of property. Overseers of the poor of every par. were directed to set to work people who had 'no ordinary trade to get their living by,' and for that purpose were empowered to raise by taxation of every inhab. and proprietor of lands, houses, tithes, mines, etc., such sums as were required for providing a sufficient stock of flax, wool, or other material on which to set the poor to work. They were also empowered to raise sums for the relief of lame, blind, old, and incapacitated persons and for putting out children as apprentices. Churchwardens and overseers were authorised to build poorhouses at the expense of the par. (for the incapacitated poor only), and justices were given power 'to assess all persons of sufficient ability for the relief and maintenance of their children,

grandchildren and parents.' Under the Act of Settlement, 1662, a newcomer to a par. likely to become a charge on its rates could be sent back to his native par. An Act of 1722 authorised par. to withhold relief from those who refused to enter workhouses. As it was found that the sick, aged, and able-bodied were hoarded indiscriminately into workhouses, Gilbert's Act of 1782 forbade the admission of able-bodied unemployed and charged par. to find them work, or, if this was impossible, provide outdoor relief. In 1795 the Berkshire justices meeting at Speenhamland decided that, in order to alleviate the poverty of agric. labourers when wages fell below a certain fixed level of subsistence, which was related to the price of wheat, the difference should be made up out of the poor rates. The 'Speenhamland System' was adopted in many other rural areas. The widespread distress among agric. workers, inefficient and dishonest administration by overseers, and the heavy demands of 'outdoor' relief on the rates led to the appointment of a commission of inquiry in 1833. The recommendations of this commission were incorporated in the Poor Law Amendment Act, 1834. The prin. changes made by the Act were: (a) the appointment of 3 commissioners to supervise the detailed local administration of the poor law; (b) the creation of unions of several par. for the more economical administration of poor relief: each par. in a union was to defray the actual charge for its own poor, and each union was to be managed by boards of guardians elected by the par. ratepayers; (c) the virtual discontinuance of 'outdoor' relief—all able-bodied paupers were obliged to go into a union workhouse if they needed relief. The harsh conditions imposed on inmates of workhouses were deliberately designed to deter the poor from 'going on the parish,' and so to keep down the rates. The functions of the 3 commissioners were later transferred to the Local Government Board, which was replaced in 1919 by the Ministry of Health.

The fear of the workhouse induced habits of thrift in working-class people. The skilled workers formed friendly societies and clubs to provide themselves with benefits to cushion the disasters of sickness and unemployment. The National Insurance Act, 1911, which introduced compulsory social insurance for most wage-earners, meant that a sick breadwinner could obtain proper medical attention without reducing his family to penury. By the beginning of the present cent. it was realised that poverty was not necessarily the fruit of indolence but the symptom of an economic disease which could be prevented by social action. This action took the form of public education, and health and infant-welfare services free from the stigma of poor law. A royal commission recommended that the treatment of the mentally defective should be removed from the boards of guardians.

The members of a royal commission appointed to examine the poor law were unable to agree, and in 1909 issued 2 separate reports. The recommendations of the majority report may be summarised as follows: (1) The boards of guardians should be replaced by a new local authority composed of nominees of co. and co. bor. councils and persons experienced in poor-law work, to be called the Public Assistance Authority (P.A.A.), for central administration and control within an enlarged area (*see* PARISH), together with local committees for dealing with applications, investigating and supervising cases, and undertaking such other duties as might be delegated by the P.A.A. (2) Only persons whom the authorities considered likely to benefit from institutional treatment should be sent to workhouses. (3) A national system of labour exchanges should be set up to deal with the able-bodied unemployed. (4) Out-relief should be given only after thorough inquiry (except in cases of urgent necessity). (5) The system of boarding-out children should be extended, subject to strict investigation of the suitability of foster-parents and homes. The minority report, which advocated more revolutionary reforms, recommended: (a) the repeal of all Acts relating exclusively to poor relief; (b) the abolition of boards of guardians and the transfer of their functions to the co. and co. bor. councils; (c) the establishment of a ministry of labour to organise a flexible deployment of the national labour force so as to prevent or minimise unemployment; (d) the repeal of the Unemployment Act and the abolition of distress committees. The gov. refused to alter the fundamental basis of poor relief, and the report was shelved. The creation of new social services early in the present cent. did, however, remove many problems of economic hardship, leaving the boards of guardians to deal with the hard core of destitution. The introduction in 1908 of the state 'means test' pensions for persons aged 70 or over implied the first major breach with the poor law. From 1911 the National Health Insurance scheme provided the worker with medical treatment and cash benefits during his incapacity; from 1926 the field of the state pension scheme was extended. As the boards of guardians were no longer an efficient unit of administration, they were abolished by the Local Government Act, 1929, which transferred their functions to cos. and co. bors. The principles of the poor law were unchanged, and the Ministry of Health exercised over the new authorities the same close control, through inspectors and auditors, etc., which it had had over the boards of guardians. The Poor Law Act, 1930, consolidated all the statute law on the subject. The administrative re-arrangement spread the burden of poor relief over wider areas. Each council had to submit its scheme of administration for the approval of the Ministry of Health and to form a Public Assistance Committee, of which at least

two-thirds had to be councillors, together with some women members.

Poor Law Relief under the old Poor Law. The general duty of giving relief extended to the following cases: setting to work the able-bodied unemployed; relieving those who were unable to work; and setting to work or apprenticing children whose parents could not maintain them. Relief was of 2 kinds, outdoor relief and institutional relief (as to the latter, it may be noted that the only statutory word was 'workhouse' and the general rules for administering workhouses remained in essentials unchanged). The Act of 1930 authorised outdoor or any other kind of relief to be given to those who were unable to work, and under the Relief Regulation Order the relief might be given unconditionally in the case of urgent necessity (as in the case of sickness, mental infirmity, etc., whether arising out of old age or not). Further, a court of summary jurisdiction might order such relief to be given in these cases, whether in kind, money, or medical relief. As regards the able-bodied, the above order provided that men must be set to work or given training and instruction and at least one-half of the relief must be otherwise than in money, and relief was granted only on the orders of the council or the appropriate committee. Actually the relief was given by the relieving officer, whose precise duties will be found described in Article 167 of the Public Assistance Order. A justice of the peace, having jurisdiction, might order relief in cases of sudden and dangerous illness, and even for persons not settled or ordinarily resident in the co. or bor. where the case was one of urgent necessity. As regards children, it is to be observed that the apprenticeship system had virtually disappeared by reason of the difficulty of apprenticing a child to a skilled trade without a premium. Children were relieved either by giving relief to their parents or through their 'adoption' by the poor-law authority, with the consequence that the council had the powers of parental control. The outdoor relief of able-bodied unemployed was taken over by the Public Assistance Board set up under the Unemployment Act of 1934 (Part II), thus relieving poor-law authorities of a large body of dependants. Unemployment insurance was thereby finally restricted to short-term unemployment.

Institutional Relief under the old Poor Law. The minister could not compel a council to provide a workhouse, but if he were requested to do so by the council itself he might order the provision of such accommodation or the adaptation of an existing building to such purpose at a cost not exceeding £1000. The later poor-law administration condemned the 'mixed workhouse,' and actually 3 different types were set up: hospitals for the sick; children's homes; and institutions for the aged and unemployed—and all these were in separate buildings or separate blocks of the same building. The poor-law authority had power to send

2 classes, namely the blind or deaf and dumb and the insane, to special estab. such as voluntary institutions or public-health hospitals. (As to former miscellaneous forms of relief see BURIAL ACTS; VAGRANTS.) It may be noted that there were special provisions relating to casuals in London as under the old law, because the care of casuals was one of the functions vested in the Metropolitan Asylums Board at the charge of the whole of London.

Poor Law Abolition. *The National Assistance Act, 1948.* The Second World War strengthened the tendency to place all major insecurity burdens on the State, whose outdoor-relief agency, renamed the Assistance Board, was entrusted with the administration of new State-financed schemes: to relieve war distress, to pay supplementary 'means test' pensions to old-age pensioners, and temporary war-injury allowances to civilians. The board was then growing into a national 'omnibus' agency for outdoor relief in cash, and the gap between State and local relief was widened in 1941 by the substitution of a much less stringent family means test for the former Unemployment Assistance Board (U.A.B.) household means test. Shorn of many cash relief functions, with an increasing transfer of its institutions and constructive services to other authorities, the poor law in 1941 became a local residual relief service, supplementing the new public services and filling in the gaps left by them. Its chief remaining functions were domiciliary relief of widows, deserted wives, and old persons not entitled to pensions; institutional relief of the chronic sick and various 'social problem' groups; and medical relief of destitute persons not entitled to National Health Insurance panel treatment.

The creation of these new income-maintenance agencies profoundly modified Brit. social life and thought. Yet the new services were still relatively experimental; their growth was piecemeal and ill-planned, and had not yet reached the final form required by modern industrial society. Britain's income-maintenance services, with the important exceptions of unemployment services and possibly of old-age pensions, were backward compared with those of many other countries.

The Beveridge Report (1942) recommended that the poor law should be abolished. This recommendation was accomplished in far-reaching reforms of the National Assistance Act, 1948 (q.v.). See F. M. Edon, *The State of the Poor*, 1797; Charles Dickens, *Oliver Twist*, 1837-8; Sir G. Nicholls, *History of the English Poor Law*, 1898; J. F. Archbold, *The Poor Law* (15th ed.), 1898; E. M. Leonard, *English Poor Relief*, 1900; Beatrice and Sidney Webb, *English Local Government: English Poor Law History* (3 vols.), 1927-9; J. J. Clarke, *Public Administrations including the Poor Laws*, 1934; W. I. Jennings, *Poor Law Code*, 1937; W. J. Ashley, *Economic Organisa-*

tion of England (new ed.), 1949; *Poor Law Returns of Ministry of Health*; *Poor Law Officers' Journal*, 1930.

Poor Man's Weather-glass, see ANA GALLIS, PIMPERNEL.

Poor Persons' Legal Aid. **Poor Prisoners' Defence.** The grant of free legal aid for poor prisoners is provided for by the Poor Prisoners Defence Act, 1930, which came into force in 1931. The analogous Act of 1903 was the first piece of legislation providing free legal aid for poor persons, but it restricted the grant of aid to a person charged with a crime for which he could be tried only at the assizes or quarter sessions, and, moreover, it rested with the magistrate to decide whether it was desirable to grant free legal aid, and even if granted it was not available until after the accused had been committed for trial. The Act of 1930, repealing the Act of 1903, applies both to indictable offences and to those triable summarily by a magistrate, and official lists are kept of solicitors and barristers willing to undertake the defence of poor prisoners, their fees being paid out of local funds. In the case of an indictable offence the accused may have free legal aid if justices, on committal for trial, or the judge of the trial court, grant a defence certificate. If the person's means are insufficient, such certificate may be granted in cases where desirable, and must be granted in the case of a murder charge. In courts of summary jurisdiction, assuming insufficient means, a defence certificate may be granted if it is considered desirable to do so by reason of the gravity of the charge or of exceptional circumstances. The Act is only intended to help poor persons to prepare and conduct a defence, where they have any defence at all, so that they may be in the same position as those who can afford to pay for it; it is not intended to provide professional assistance for the purpose only of making a plea in mitigation of sentence on a guilty person.

Civil Cases. The Legal Aid and Advice Act, 1949, and regulations made thereunder, set up a State legal-aid scheme administered by the Law Society through legal aid committees throughout England and Wales. At present (1957) legal aid is available only for civil proceedings—ultimately it is intended that the Act shall apply to criminal cases. Applications for legal aid are considered by a local committee of solicitors and barristers, which, if satisfied that the applicant has reasonable grounds for bringing or defending proceedings, issues a civil-aid certificate for that purpose. Eligibility for legal aid also depends on a means test made by the National Assistance Board, which determines what contribution (if any) should be made by the applicant towards the costs of the proceedings. The Board takes into account the applicant's income, capital, and family responsibilities. Contributions are usually payable by instalments. The applicant may usually choose his own solicitor, whose fees, together with those of any counsel employed, are assessed by the court and

paid by the Law Society out of the legal-aid fund. Broadly speaking, persons whose incomes do not exceed £650 per annum may obtain legal aid. Provisions in the Act for free legal advice (as opposed to aid in proceedings) have not yet (1957) been brought into force. Meanwhile much useful work is being done by legal-aid centres run by voluntary bodies.

Scotland. Similar legal-aid facilities have been provided by the Legal Aid and Solicitors (Scotland) Act, 1949.

Poort, see Nek.

Popayán, episcopal see, city, and cap. of the dept. of Cauca, Colombia, at the foot of the volcano of Puracé, 235 m. SW. of Bogotá. It stands at an altitude of 5700 ft. and has a cathedral and univ. and beautiful old monasteries and cloisters of classic Sp. architecture. The carved pulpit of San. Francisco and the jewelled monstrances of that church and of San Agustín are noteworthy. The city was founded in 1536 and was the home of the poet Guillermo Valencia. Gold, silver, platinum, and copper are found in the neighbourhood. The chief industries are shoes, bricks, blankets, and processing agric. products. Pop. 18,300.

Pope, Alexander (1688-1744), poet and satirist, b. London, the son of a rich Rom. Catholic linen-draper. Because of his religious faith, he was educ. privately. A severe illness at the age of 12 affected his health for the rest of his life and deformed his figure, about which disfigurement he was always very sensitive. He was a most precocious boy, and was fond of books from a very early age. While at school he was given to composition, and imitated his favourite authors. The exact date when he wrote his *Pastorals* cannot be stated, but they were pub. in Tonson's *Miscellany* in 1709. These poems attracted a good deal of attention, as did the anonymous *Essay on Criticism*, 1711. Addison (q.v.) praised the *Essay* in the *Spectator*, and when Steele introduced the young author to him, he gave P. the benefit of his patronage. *The Rape of the Lock*, 1712, a brilliantly amusing mock-heroic poem, brought P. into further prominence. The intimacy between P. and Addison did not long endure. There were faults on both sides. Addison's patronising attitude would have irritated a man more patient than P., but P.'s sensibility was abnormal, and the breach is said to have arisen when Addison declared that Tickell's trans. of Homer was the best. P. retaliated with the famous 'Atticus' passage, in which he ridiculed Addison unmercifully. He became a member of the Scriblerus Club, and made friends with Swift, Gay, Congreve, and their set. In 1715 he issued the first instalment of his trans. of the *Iliad*, the last vol. of which did not appear until 5 years later. He leased a villa at Twickenham in 1719, and there made acquaintance with Lady Mary Wortley Montagu, with whom he afterwards had a bitter quarrel, and contracted a more lasting intimacy with Teresa and Martha Blount,

to the latter of whom he was devoted. He ed. the poems of Parnell, 1722, and later the works of Shakespeare, 1725; this, however, was practically a failure. After this, with the assistance of Wm. Broome and Elijah Fenton, he prepared a trans. of the *Odyssey*, 1725-6, from which he derived a handsome profit.

P., in 1725, conceived the idea of writing a satire upon contemporary men of letters, and 3 years later this appeared anonymously under the title of *The Dunciad*, the archdunce being Lewis Theobald, who had written a scathing attack on P.'s ed. of Shakespeare. The book created a tremendous sensation, and many retorts were made upon the author, whose veil of anonymity was too thin to disguise his identity. The satire was reissued, with additions, in the following year, but the authorship was not avowed until 1735. Of its brilliance there is no question, but it did not fulfil P.'s purpose of extinguishing the Grub Street writers, rather serving to bring them into prominence for all time, since the memory of many to whom allusion is made in the lampoon (for such it is in reality) is still kept alive by the vehicle intended for their destruction. In 1742 P. brought out a revised *Dunciad*, in which he dethroned Theobald and set up in his place the veteran actor and dramatist Colley Cibber. He pub. the *Essay on Man*, 1732-4, and about the same time the *Moral Essays*, which were but a part of a contemplated series of poems, suggested by Bolingbroke, in which human nature was to be exhaustively and systematically surveyed. Among his last pubs. were his *Imitations of Horace*, 1733-9.

As a man P. suffered much from excessive sensibility, and it was this unfortunate weakness that caused him to quarrel so frequently and so vigorously. His devotion to his mother is the most pleasing, as it is the most natural trait in his character. The illness which warped his body seems also to have affected his mind, and to have left in him a certain streak of dishonesty, which manifested itself again and again, most noticeably in the case of the pub. of his letters, which he printed not as they were written but altered for his own ends. 20th-cent. biographers, however, have stressed the more pleasant side of P.'s character, and the more traditional portrait of him, drawn by the Romantics, has been somewhat modified. As a poet he occupies a high place in Eng. literature. The smoothness of his line is remarkable throughout his work, and to secure this he laboured unremittingly, though his writings lack any emotional quality and his finest passages show him as a master of rhetoric rather than as an interpreter of the spiritual. If in the Horatian satires and in the fourth book of the *The Dunciad* he is, generally speaking, at his best, he is brilliant in such earlier pieces as Epistle V (*Moral Essays*) addressed to Addison. The standard ed. of his works and correspondence is that prepared by Elwin and Courthope, 1871-89. See lives and studies by J.

Warton, 1756, 1782; S. Johnson, 1781; L. Stephen, 1878; G. Paston, 1809; G. Lytton Strachey, 1925; E. Sitwell, 1930; G. Sherburn, 1934; N. Ault, 1949.

Pope, see PAPACY; POPES, LIST OF THE.
Pope (fish), see RUFFE.

Pope-Hennessy, Dame Una Constance (1876-1949), Brit. biographer, daughter of Sir Arthur Birch, in 1910 married Maj.-Gen. Ladislaus Pope-Hennessy. Her biographical works include *Three English Women in America*, 1929, and studies of Poe, 1934, Dickens, 1945, and Charles Kingsley, 1948. *The Closed City*, 1938, tells of a visit she paid to Leningrad. In 1920 she was made a Dame Commander of the Order of the British Empire.

Poperinghe, tu in the prov. of W. Flanders, 6 m. W. of Ypres. It has textile manufs. and grows hops, of which it is the most important mkt in Belgium. It was the railhead for the Ypres sector during the First World War. It was at P. that part of the Brit. 1st Corps arrived in Oct. 1914 and participated in the operations which developed into the first battle of Ypres. Pop. (1955) 12,500. See also TOCH.

Popes, List of the. Dates of the first 14 pontiffs are approximate. Names of antipopes are in square brackets.

1. St Peter	42-64
2. St Linus	65-76
3. St Anacletus (Cletus)	77-88
4. St Clement I	88-97
5. St Evaristus	97-105
6. St Alexander I	105-115
7. St Sixtus I	115-125
8. St Telesphorus	125-136
9. St Hyginus	136-140
10. St Pius I	140-155
11. St Anicetus	155-166
12. St Soter	166-175
13. St Eleutherius	175-189
14. St Victor I	189-199
15. St Zephyrinus	199-217
16. St Calixtus I	217-222
[St Hippolytus]	
17. St Urban I	222-230
18. St Pontian	230-235
19. St Anteros	235-236
20. St Fabian	236-250
21. St Cornelius	251-253
[Novatian]	
22. St Lucius I	253-254
23. St Stephen I	254-257
24. St Sixtus II	257-258
25. St Dionysius	259-268
26. St Felix I	269-274
27. St Eutychian	275-283
28. St Caius	283-296
29. St Marcellinus	296-304
30. St Marcellus I	308-309
31. St Eusebius	310
32. St Melchades	311-314
33. St Sylvester I	314-335
34. St Mark	336
35. St Julius I	337-352
36. Liberius	352-366
[Felix II]	
37. St Damasus I	366-384
38. St Siricius	384-399
39. St Anastasius I	399-401
40. St Innocent I	401-417
41. St Zosimus	417-418

St Boniface I	418-422
[Eulalius]	
St Celestine I	422-432
St Sixtus III	432-440
St Leo I	440-461
St Hilary	461-468
St Simplicius	468-483
St Felix III	483-492
St Gelasius I	492-496
Anastasius II	496-498
St Symmachus	498-514
[Laurence]	
St Hormisdas	514-523
St John I	523-526
St Felix IV	526-530
Boniface II	530-532
[Dioscorus]	
John II	532-535
St Agapitus I	535-536
St Silverius	536-538
Vigilius	538-555
Pelagius I	555-561
John III	561-574
Benedict I	575-579
Pelagius II	579-590
St Gregory I	590-604
St Sabinian	604-606
Boniface III	607
St Boniface IV	608-615
St Deusdedit	615-618
Boniface V	619-625
Honorius I	625-638
Severinus	638-640
John IV	640-642
Theodore I	642-649
St Martin I	649-653
St Eugenius I	654-657
St Vitalian	657-672
Adoatus	672-676
Donus	676-678
St Agatho	678-681
St Leo II	681-683
St Benedict II	683-685
John V	685-686
Conon	686-687
[Theodore]	
[Paschal]	
St Sergius I	687-701
John VI	701-705
John VII	705-707
Sisinnius	708
Constantine I	708-715
St Gregory II	715-731
St Gregory III	731-741
St Zachary	741-752
Stephen II	752
Stephen III	752-757
St Paul I	757-767
[Constantine]	
[Philip]	
95. Stephen IV	768-772
96. Adrian I	772-795
97. St Leo III	795-816
98. Stephen V	816-817
99. St Paschal I	817-824
100. Eugenius II	824-827
101. Valentine	827
102. Gregory IV	827-844
[John]	
103. Sergius II	844-847
104. St Leo IV	847-855
105. Benedict III	855-858
[Anastasius]	
106. St Nicholas I	858-867
107. Adrian II	867-872

108. <i>John VIII</i>	872-882	163. <i>Celestine II</i>	1143-1144
109. <i>Martinus I</i>	882-884	164. <i>Luctus II</i>	1144-1145
110. <i>St Adrian III</i>	884-885	165. <i>Bl. Eugenius III</i>	1145-1153
111. <i>Stephen</i>	885-891	166. <i>Anastasius IV</i>	1153-1154
112. <i>Formosus</i>	891-896	167. <i>Adrian IV</i>	1154-1159
113. <i>Boniface VI</i>	896	168. <i>Alexander III</i>	1159-1181
114. <i>Stephen VII</i>	896-897	[<i>Paschal III</i>]	1164
115. <i>Romanus</i>	897	[<i>Calixtus III</i>]	1168
116. <i>Theodore II</i>	897	[<i>Innocent III</i>]	1179
117. <i>John IX</i>	898-900	169. <i>Lucius III</i>	1181-1185
118. <i>Benedict IV</i>	900-903	170. <i>Urban III</i>	1185-1187
119. <i>Leo V</i>	903	171. <i>Gregory VII</i>	1187
120. <i>Christopher</i> (probably an antipope)	903-4	172. <i>Clement III</i>	1187-1191
121. <i>Servius III</i>	904-911	173. <i>Celestine III</i>	1191-1198
122. <i>Anastasius III</i>	911-913	174. <i>Innocent III</i>	1198-1216
123. <i>Lando</i>	913-914	175. <i>Honorius III</i>	1216-1227
124. <i>John X</i>	914-928	176. <i>Gregory IX</i>	1227-1241
125. <i>Leo VI</i>	928-929	177. <i>Celestine IV</i>	1241
126. <i>Stephen VIII</i>	929-931	178. <i>Innocent IV</i>	1243-1254
127. <i>John XI</i>	931-935	179. <i>Alexander IV</i>	1254-1261
128. <i>Leo VII</i>	936-939	180. <i>Urban IV</i>	1261-1264
129. <i>Stephen IX</i>	939-942	181. <i>Clement IV</i>	1265-1268
130. <i>Martinus II</i>	942-946	182. <i>St Gregory X</i>	1271-1276
131. <i>Agapitus II</i>	946-955	183. <i>St Innocent V</i>	1276
132. <i>John XII</i>	955-964	184. <i>Adrian V</i>	1276
132a. <i>Leo VIII</i>	963 (elec- tion of doubtful validity)	185. <i>John XXI</i>	1276-1277
133. <i>Benedict V</i>	964 (elec- tion of doubtful validity)	186. <i>Nicholas III</i>	1277-1280
134. <i>John XIII</i>	965-972	187. <i>Martin IV</i>	1281-1285
135. <i>Benedict VI</i>	973-974	188. <i>Honorius IV</i>	1285-1287
[<i>Boniface VIII</i>]	974	189. <i>Nicholas IV</i>	1288-1292
136. <i>Benedict VII</i>	974-983	190. <i>St Celestine V</i>	1294
137. <i>John XIV</i>	983-984	191. <i>Boniface VIII</i>	1294-1303
138. <i>John XV</i>	985-996	192. <i>St Benedict XI</i>	1303-1304
139. <i>Gregory V</i>	996-999	193. <i>Clement V</i>	1305-1314
[<i>John XVI</i>]	997	194. <i>John XXII</i>	1316-1334
140. <i>Sylvester II</i>	999-1003	[<i>Nicholas V</i>]	1328
141. <i>John XVII</i>	1003	195. <i>Benedict XII</i>	1334-1342
142. <i>John XVIII</i>	1003-1009	196. <i>Clement VI</i>	1342-1352
143. <i>Sergius IV</i>	1009-1012	197. <i>Innocent VI</i>	1352-1362
[<i>Gregory VII</i>]	1012-1024	198. <i>Bl. Urban V</i>	1362-1370
144. <i>Benedict VIII</i>	1024-1032	199. <i>Gregory XI</i>	1370-1378
145. <i>John XIX</i>	1032-1044	[<i>Clement VII</i>]	1378-1394
146. <i>Benedict IX</i>	1044 (elec- tion of doubtful validity)	[<i>Benedict VIII</i>]	1394-1417
146a. <i>Sylvester III</i>	1044 (elec- tion of doubtful validity)	[<i>Clement VIII</i>]	1417-1429
147. <i>Gregory VI</i>	1045-1046	200. <i>Urban VI</i>	1378-1389
148. <i>Clement II</i>	1046-1047	201. <i>Boniface IX</i>	1389-1404
149. <i>Damasus II</i>	1048	202. <i>Innocent VII</i>	1404-1406
150. <i>St Leo IX</i>	1049-1054	203. <i>Gregory XII</i>	1406-1415
151. <i>Victor II</i>	1055-1057	[<i>Alexander V</i>]	1409-1410
152. <i>Stephen X</i>	1057-1058	[<i>John XXIII</i>]	1410-1415
[<i>Benedict X</i>]	1058	204. <i>Martin V</i>	1417-1431
153. <i>Nicholas II</i>	1059-1061	205. <i>Eugenius IV</i>	1431-1447
154. <i>Alexander II</i>	1061-1073	[<i>Felix V</i>]	1440-1449
[<i>Honorius II</i>]	1061	206. <i>Nicholas V</i>	1447-1455
155. <i>St Gregory VII</i>	1073-1085	207. <i>Calixtus III</i>	1455-1458
[<i>Clement III</i>]	1084	208. <i>Pius II</i>	1458-1464
156. <i>Bl. Victor III</i>	1086-1087	209. <i>Paul II</i>	1464-1471
157. <i>Bl. Urban II</i>	1088-1099	210. <i>Sixtus IV</i>	1471-1484
158. <i>Paschal II</i>	1099-1118	211. <i>Innocent VIII</i>	1484-1492
[<i>Theodoric</i>]	1100	212. <i>Alexander VI</i>	1492-1503
[<i>Albert</i>]	1102	213. <i>Pius III</i>	1503
[<i>Sylvester IV</i>]	1105	214. <i>Julius II</i>	1503-1513
159. <i>Gelasius II</i>	1118-1119	215. <i>Leo X</i>	1513-1521
[<i>Gregory VIII</i>]	1118	216. <i>Adrian VI</i>	1522-1523
160. <i>Calixtus II</i>	1119-1124	217. <i>Clement VII</i>	1523-1534
161. <i>Honorius II</i>	1124-1130	218. <i>Paul III</i>	1534-1549
[<i>Celestine II</i>]	1124	219. <i>Julius III</i>	1550-1555
162. <i>Innocent II</i>	1130-1143	220. <i>Marcellus II</i>	1555
[<i>Anacletus</i>]	1130	221. <i>Paul IV</i>	1555-1559
[<i>Victor IV</i>]	1138	222. <i>Pius IV</i>	1559-1565
		223. <i>St Pius V</i>	1566-1572
		224. <i>Gregory XIII</i>	1572-1585
		225. <i>Sttus V</i>	1585-1590
		226. <i>Urban VII</i>	1590
		227. <i>Gregory XIV</i>	1590-1591

used by Malthus in his *Essay on the Principle of Population as it Affects the Future Improvement of Society*, 1798, to which posterity has accorded a mixed reception, were directed to show that P. increases in a geometrical ratio, while subsistence increases only in an arithmetical ratio, and that consequently, unless there existed checks on P., a dearth of material for subsistence would soon prevail. No legislator in the world's hist. has yet ventured to lay down artificial checks on P. (rather has the converse been the case in both ancient and modern states, e.g. the Caducary legislation of Augustus, the Fr. Gov. bounties on large families, and the Brit. system of family allowances). Malthus, in the first ed. of his work, laid down that the positive checks of vice and misery necessarily limited P., and seemed to say that such checks were nevertheless actual barriers to all social improvement. In the later ed. in 1803 he modified his views, and, while regarding war, famine, pestilence, vice, misery, or other 'positive checks' more or less as unmixed evils, drew special attention to the 'prudential' check on P. In most countries both positive and prudential checks are active agents in restricting P., but as time progresses it seems that the latter grow stronger, while war, famine, and earthquake hardly appear to be less effective than hitherto. Large numbers, for example, were exterminated in E. Europe during the Second World War.

In the 20th cent. the movements of P. have been increasingly regulated by govts. This is exemplified by the barriers raised against the settlement of Chinese and Jap. in Australia, and by similar embargoes against these races on the W. seaboard of America; the adoption of a 'quota' by the U.S.A., and Canada and other Brit. dominions, under which the number of immigrants of different nationalities is fixed; the registration of aliens, with consequently greater difficulties of settling in European countries. The 'quota' system of the U.S.A., which (prior to the Second World War) favoured Germany, Great Britain, Ireland, France, and NW. Europe, told severely against Russia, Italy, and SE. Europe, which before 1925 found America the chief outlet for surplus P. Such restrictions direct attention to the subject of distribution of the world's P. Australia follows a policy of remaining a white man's land, and the development of her secondary industries tends largely to increase the P. of her cities at the expense of the rural areas.

The most noticeable general feature of recent changes in P. has been the great increase of city dwellers. For example, in the U.S.A. in 1900 there were 10,500,000 persons living in cities of over 250,000 inhab.; by 1920 the number had risen to 21,000,000, and by 1950 to 35,000,000. Similarly, in 1920 there were 287 cities of more than 25,000 inhab. against 160 20 years before. These figures are evidence of a general movement throughout white countries which can be accounted for by: (1) easier facilities of travel; (2)

new trades and industries that develop best where the pop. is the most dense, and (3) improvements in agric. machinery and farming implements which make fewer employees necessary.

Before the Second World War the threatened decline in P. in Great Britain induced considerable comment and discussion in Parliament and the press. In a memorandum which he presented to the Royal Commission on the Geographical Distribution of the Industrial Population (1939), however, the registrar-general reached conclusions which seemed to differ from those of the majority of unofficial statisticians, whose views he regarded as too alarmist. Assuming that fertility remained as it was in 1938, that mortality would gradually decline according to reasonable anticipation, and that the yearly increase of immigration over emigration (as observed in 1931-7) reached vanishing point by 1951 (which appears already to be the case), he forecast total P. in 1951 at 47,501,000, in 1961 at 47,192,000, and in 1971 at 45,980,000; but assuming a constant ann. supply of 700,000 births (the number registered in Great Britain as at the date of the memorandum), and assuming a concerted attempt to avoid the threatened decline in P., he forecast the total P. in 1951 at 47,835,000, in 1961 at 48,376,000, and in 1971 at 48,595,000. It was generally agreed that the P. decline could be prevented only by raising the fertility rates far above the level of 1938, and the registrar-general suggested the necessity of an immediate increase in the ann. number of births of 130,000 (*Statistical Review*, 1938). In fact, Britain's P. had reached 48,929,000 by 1951; the P. is still increasing and, on present indications, should reach a maximum in about 1985 of roughly 52,000,000, when, unless family size increases, a slow decline will begin. In 1944 a royal commission was instructed to examine the facts relating to and the causes of P. trends in Great Britain and to make recommendations. Aided by 3 specialist committees, statistical, economic, and biological and medical, the commission in June 1949 pub. a White Paper which concluded that Britain's fate as a world power might be sealed in some 30 years' time unless the people reverted to larger families, i.e. unless at least every fifth couple in the land had one extra child. The White Paper based many of its proposals on one fact of major significance: for some 70 years the size of the Brit. family has fallen, owing to deliberate limitation, and now averages only 2.2 children to each married couple. In the opinion of the commission this is 'insufficient for replacement.' Yet only a 6 per cent increase would be enough to ensure our pop. being stable from generation to generation. (For details of the White Paper see VITAL STATISTICS.) See R. R. Kuczynski, *The New Population Statistics*, 1942, and Eva M. Hubbard, *The Population of Britain*, 1948.

Populism (Russian *Narodnichestvo*). Russian ideological and political trend,

originating among the radical intelligentsia (q.v.) in the 1860's. Its precursors were Herzen and Chernyshevskiy (qq.v.), who thought that Russia, with its peasant communes (see MIR), could reach socialism through a peasant revolution, avoiding the capitalist stage. Revolutionary P. was particularly strong in the 1870's, when over a thousand students went to the countryside ('into the people'—hence the name P.) as propagandists. Most of them adhered to Bakunin's (q.v.) view that Russian peasants were ready to rise against the State and the landlords, though there were also the followers of Lavrov (q.v.), who held that a sufficient number of peasant leaders had first to be brought up. The underground organisation 'Land and Freedom', formed in 1876, followed Bakunin's lead, but had little success and split in 1879 into 'People's Freedom', which accepted the Jacobin teaching of P. N. Tkachëv on the seizure of State power by a revolutionary minority, and 'Black Redistribution' (i.e. universal redistribution of land), led by Plekhanov (q.v.), which remained Bakuninist. The 'People's Freedom' party led by A. Zhelyabov assassinated Alexander II (q.v.) and was broken up by the police, though unconnected groups continued to exist throughout the 1880's and early 1890's. The 'Black Redistribution', together with some Lavrovist groups, gave birth to the Russian Social Democracy (see RUSSIAN SOCIAL DEMOCRATIC LABOUR PARTY). During the 1880's and 90's the dominant trend was the Liberal P., whose leader, Mikhailovskiy, stressed the humanitarian and evolutionary elements in the teachings of Herzen and Lavrov, and whose adherents working in the local gov. (see ZEMSTVO) did splendid practical service to the peasants. In 1902 the liberal and the revived revolutionary trends were united in the party of Socialist Revolutionaries (q.v.), but both tendencies continued to exist, causing sev. splits and the formation of minor parties (moderate Popular Socialists and Maximalists in 1905, Left Socialist Revolutionaries in 1917). The Tkachëv tradition greatly influenced Lenin and became a component part of Leninism, while the tradition of Liberal P. was continued in Neo-Populism (q.v.). At present there exists among *émigrés* the Association of Russian Populists, headed by Korenskii (q.v.).

See S. Stepanyak, *Underground Russia*, 1883; R. Hare, *Pioneers of Russian Social Thought*, 1951; D. Mitrany, *Marx against the Peasant*, 1951; H. Seton-Watson, *The Decline of Imperial Russia*, 1952; D. Footman, *Red Prelude*, 1955; D. W. Treadgold, *Lenin and his Rivals*, 1955.

Populonia, see PIONIRIO.

Poquelin, Jean Baptiste, see MOLIERE.

Porbandar, tn and seaport of Bombay State, India, cap. of former P. State, on the SW. of the Kathiawar peninsula, 110 m. NW. of Diu. It has stone quarries. P. is an old port for traffic with E. Africa. Mahatma Gandhi was b. a subject of P. State.

Porcelain, name given to several groups of ceramic wares characterised by a white or near white body, a quality of translucency, and a vitrified—and therefore non-porous—body.

Hard-paste porcelain, or true P. in the European sense, was first made in China as early as the T'ang Dynasty (AD 618–907). It is made of kaolin (q.v.) and feldspathic petuntse (q.v.). These two materials are mixed and fired to a temperature of 1300° C.–1400° C., when they fuse and form a white translucent cement around the opaque granules of kaolin. The body is so hard that it cannot be cut by ordinary steel. Potters of other Asiatic countries and then of Europe strove for centuries to imitate it. In Persia from the 13th to the 17th cents. a stoneware of a high degree of translucency and whiteness with an alkaline siliceous glaze was produced, but it was not P. (see PERSIAN ART). By the early 17th cent. P. was made in Japan, at Arita, where Sakajida Kakiemon, a Jap. potter, first enamelled Jap. P. c. 1660, and his name is given to a sparingly decorated group of late 17th- and 18th-cent. wares, much copied at Chantilly, Meissen, Chelsea, Bow, etc. In Europe the secret of true P. was discovered in 1708 by Johann Friedrich Bottger (1682–1719), alchemist to the Elector of Saxony. In 1710 the Elector founded the Meissen factory (q.v.) under the direction of Bottger, who remained in charge until 1715. The secret was made known by runaway Meissen craftsmen, first at Vienna in 1718 and at Venice in 1719. After 1750 rival Ger. factories were set up and triumphed at Meissen's expense when Saxony was defeated in the Seven Years War (1756–63). In France, hard-paste P. was not made until 1768, at Sèvres (q.v.). In England it was only made at Plymouth (q.v.) in 1768–70 by William Cookworthy, at Bristol by Champion from 1770, and later at New Hall, Staffordshire. See BISCUIT.

Soft-paste porcelain, or artificial P. is the result of mixing of the clay with glass or the materials of glass, fused and powdered. The earliest known examples were made in the late 16th cent. at Florence, the so-called Medici P. It was next made in France at Rouen and Saint-Cloud in the last quarter of the 17th cent. During the 18th cent. it was made in France at Mennecey, Chantilly, Vincennes, Sèvres (q.v.), and c. 1745 it was first made in England at Chelsea and at Bow (qq.v.). Soon after a porcelain factory started at Derby (q.v.), and from 1750 to 1760 another factory operated at Longton Hall (q.v.). The factory founded by Benjamin Lund in Bristol c. 1750 (q.v.) was transferred 2 years later and became the famous Worcester (q.v.) factory producing a soapstone type of P. In 1757 a small P. factory was founded in Lowestoft (q.v.), the only Eng. factory other than Bow to produce P. containing a high percentage of bone ash. These soft-paste P.s ceased to be made by about 1810 in England and France, except for later attempts at forgeries. See BISCUIT.

Hybrid-paste porcelain, used by certain 18th-cent. It. factories (Cozzi factory in Venice, Nove, Treviso, and Doccia), is a mixture of magnesian clays and rocks similar to steatite, which results in a grey P.

Bone-ash china, a hybrid paste, was discovered and made in England towards the end of the 18th cent. See CHINA-WARE.

See W. B. Honey, *German Porcelain*, 1947, *Old English Porcelain*, 1948, and *French Porcelain*, 1950; A. Lane, *Italian Porcelain*, 1956.

Porcellanite, Argillite, or Baked Shale, name given to highly indurated or partly fused shales found in contact with dykes and intrusive igneous masses; a result of contact metamorphism (q.v.).

Porch, in N. America, the veranda of a dwelling-house.

Porch, The, refers to the *stoa poeikile* (painted porch) in which Zeno taught, and is therefore a synonym for the Stoics and their school at Athens.

Porché, François (1877-1944), Fr. dramatist and poet, b. Cognac. His verse plays *Les Buteurs et la Finette*, 1918, *La jeune fille aux jupes roses*, 1919, and *Le Chevalier de Colomb*, 1922, are a mixture of the traditional and modern drama. He attained far greater success with his prose plays *Tzar Lénine*, 1931, *La Race errante*, 1932, and *Le lever du soleil*, 1941. He has also pub. sev. vols. of poetry, *Les Commandements du Destin*, 1921, *Sonates*, 1923, and *Vers*, 1934.

Porcupine (Lat. *porcus*, pig; *spina* thorn), name given to any species of the rodent family Hystriidae. All are characterised by the possession of spines and hollow quills, smooth-soled feet, non-prehensile tails, and the grinding teeth have external and internal folds. They are nocturnal and herbivorous. The best-known species is *Hystrix cristata*, the common P., a native of S. Europe and N. and W. Africa. It is one of the largest of rodents, and its specific name is obtained from its crest of long hairs; the body spines are solid, and the tail bears hollow quills. There are 11 other species of *Hystrix*. The genus *Atherura* contains 4 species, known as brush-tail P.s. The remaining Old World P. is *Trichys lipura*. Tree P.s belong to a distinct family (Erethizontidae) and are common to the new world.

Porč, seaside resort in Croatia, Yugoslavia, on the W. side of the peninsula of Istria (q.v.). It has many medieval and Renaissance buildings, and a remarkable 6th-cent. basilica, the *Basilica Eufasiana*. It has a large trade in wines. Pop. 31,600.

Poros, see SKIN.

Porfirio Diaz, see PIEDRAS NEGRAS.

Pori (Björneborg), tn of Finland, 60 m. NNW. of Turku, situated at the mouth of the R. Kokemäki in the Gulf of Bothnia. Shipbuilding is the chief industry, and P. exports fish, timber, and pitch. Pop. 46,600.

Porifera, see SPONGES.

Pork, see PIG.

Porkkala, small area in the S. of Finland (W. of Helsinki) kept by the Russians as a base after the Second World War, and returned to Finland 20 Jan. 1956.

Porlamar, chief commercial centre of Margarita Is., Venezuela. Pop. 6500.

Porlock, vil. of Somerset, England, 6 m. W. of Minehead. It is characterised by its steep streets, especially the old main road from P. to Devon, which has a gradient of 1 in 4, and is now used for motor trials. P. Bay is an opening of the Bristol Channel, $4\frac{1}{2}$ m. wide. Before the sea receded P. flourished as a mkt tn and seaport. Pop. 1400.

Pornographic Publications, see OBSCENE PUBLICATIONS.

Porosity. The P. of a building material such as brick or stone is the ratio of pore space in the material to the total volume of the material. P. per cent is calculated from the apparent density a and the density of the powdered material s from the formula $P. \text{ per cent} = \frac{s-d}{s}$

$\times 100$. The saturation coefficient is the

to their entire extent, absorption being governed by the degree of capillary attraction they are able to exert. A stone which has a saturation coefficient of 0.8 should be immune from the action of frost. The average percentage pore space of the chief rocks is granite 0.3-2.6, gabbro and basalt 0.4-0.5, dolerite 0.2-1.2, gneiss 2.5-4.4, marble 0.4-1.8, limestone 1.0-20.0, sandstone 1.9-22.0.

Porphyrogenitus, see CONSTANTINE VII.

Porphyry (Porphyrius), Neo-platonic philosopher, b. in Palestine c. AD 233. After studying at Athens under Longinus, he settled at Rome and became a pupil of Plotinus (q.v.), whose writings he subsequently ed. and whose life he wrote. This latter work has survived together with an important treatise *On Abstinence* of P's polemic against the Christian religion we have only fragments; the work itself was publicly destroyed in 448. See J. Bidez, *Vie de Porphyre*, 1913.

Porphyry, name originally applied to an Egyptian rock used for ornamental purposes and known as *porfido rosso antico*. It occurs as a dyke in the granite of Jebel Dokhan (*mons porphyrites*) in Egypt, and shows a felspathic base with plates of hornblende, magnetite, and disseminated oligoclase felspar. There are large felsars in the P. of Egypt, and this has given rise to the geological term porphyritic to describe crystals in an igneous rock markedly larger than the rule. The porphyritic felspar in the type P. is associated with a pink epidote 'withamite' which produces a red tint. The name P. is now applied by geologists to certain acid and sub-acid rocks which show porphyritic structure. The large crystals or phenocrysts in the P.s are of orthoclase with occasional plagioclase, giving rise to a parallel intergrowth. The ground mass is generally of felspar or the more acid types of felspar and quartz.

Geologists use a descriptive prefix when specifying P.s, thus aenite P., orthoclase P., quartz P., and rhomb P.

Porpoise, name given to the 'beakless,' smaller members of the cetacean family, Delphinidae. They also have a triangular dorsal fin and spade-shaped teeth. The common P. (*Phocaena phocaena*) is the most abundantly occurring cetacean in Brit. seas. It is mainly found in the coastal waters of the N. Atlantic, where it feeds on fishes such as herrings and whittings. The finless black P., *Neomeris phocaenoides*, is much like the common P. in form, but the dorsal fin is not developed.

Porpora, Nicola (1686-1768), It. composer, b. Naples, studied there at the Conservatorio di Santa Maria, and began to produce operas, of which he wrote a vast number, in 1708. He was in London in 1738-6, and set himself up as a rival to Handel, and the same happened with Hasse at Dresden in 1747-52. After this he lived in Vienna, where Haydn became his pupil. In 1758 he returned to Naples, which he still regarded as his home, though he had spent various periods at Venice. He taught for a year at the Conservatorio di Sant' Onofrio (1760-1), but after that fell on evil times, and he d. in extreme poverty at Naples.

Porrentruy, small tn in the canton of Bern, near the Fr. frontier. The castle overlooking the tn was the residence of the bishops of Basel, 1527-1792. P. has some famous schools, and manufs. watches and shoes. Pop. 7000.

Porsena, or **Porsenna**, Lars, King of Clusium in Etruria, who marched with an army against Rome in order to restore Tarquinius Superbus (q.v.) to the throne. He captured the Janiculum, but the whole Etruscan Army is said to have been kept at bay at the Sublician bridge by Horatius Cocles and his two companions. The Etruscan invaders thereafter laid siege to Rome, but peace was concluded by the advice of Scaevola. The whole story must be treated as legend.

Porson, Richard (1759-1808), classical scholar, b. E. Ruston, Norfolk, the son of the par. clerk there. Thanks to the generosity of friends, he was educ. at Eton, and in 1777 entered at Trinity College, Cambridge, where he had a brilliant career. He was fellow of his college in 1782-91. This position he lost by refusing to take orders. From 1792 he was prof. of Greek at the univ. In 1806 he became librarian to the London Institution. P. was one of the foremost of Gk scholars and critics, but he left very little permanent work of his own. He ed. 4 plays of Euripides, viz. *Heruba*, *Orestes*, *Phoenissae*, and *Medea*. His most widely read work was his *Letters to Archdeacon Travis* on the disputed passage, 1 John v. 7, which is considered a masterpiece of acute reasoning. In 1817 an endowment was made in P.'s memory to provide an ann. prize to be awarded to Cambridge undergraduates for the best trans. of a passage of Eng. poetry into Gk verse. See life by J. S. Watson, 1861, and monograph by M. L. Clarke, 1937.

Port, see STARBOARD.

Port Adelaide, chief seaport of S. Australia, on the gulf of St Vincent, 7½ m. NW. of Adelaide. It is connected by bus and railway services with Adelaide. It has 18,000 ft of wharves in the inner and outer harbours; there are extensive wool-stores, oil installations, and timber yards, and chemical, cement, superphosphate, and other industries. Pop. 33,400.

Port Alberni, seaport on the W. side of Vancouver Is., Brit. Columbia, with a large trade in lumber and pulp and paper products. The name Alberni is applied to the inlet on which P. A. stands, being an extension of Barkley Sound. Pop. 10,170.

Port Angeles, tn of U.S.A., in Washington state. The co. seat of Clallam co., it stands on the strait of Juan de Fuca 60 m. NW. of Seattle. Its products include fish, lumber, cellulose, paper, concrete, and dairy products; it is a resort centre and H.Q. for Olympic National Park. Pop. 11,233.

Port Arthur: 1. City of Ontario, Canada, co. tn of Thunder Bay dist., on the NW. coast of Lake Superior. It has the largest grain elevator in the world. Industries include 16 elevators (total capacity 150,000,000 bushels), a ship-building plant with a large dry dock, timber companies, aerated water and wood-working plants, and pulp and paper mills. In the vicinity are deposits of iron pyrites, molybdenum, feldspar for potash, silica for glass, silver, lead, copper, zinc, and gold mines and the largest hematite iron mine in Canada. There is ample and cheap hydro-electric power. P. A. is a health resort for asthmatic persons. In 1854 the Fr. explorers, Groseveliers and Radisson, crossed the neighbourhood on their way to James Bay. In 1870 Lord Wolseley disembarked troops here from E. Canada, on the way to quell the Red Indian rebellion, and named the spot 'Prince Arthur's Landing,' after the Duke of Connaught, later governor-gen. of Canada. It was incorporated as the tn of P. A. in 1884, and became a city in 1906. Pop. 35,305.

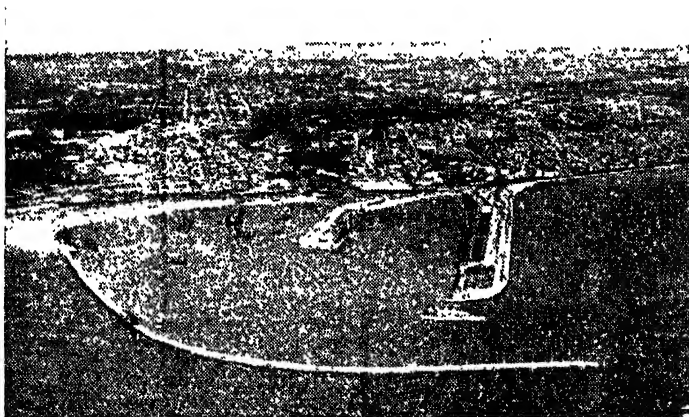
2. Chief port of entry for the Sabine dist. of Texas, U.S.A. It is on the W. shore of Lake Sabine and communicates with the Gulf of Mexico by the Sabine-Neches waterway. It has important oil refineries, and exports petroleum, also grain, cotton, rice, and lumber. Pop. 57,530.

Port Arthur, harbour-bay in S. Manchuria, at the S. end of the peninsula of Liaotung, at the entrance of the Gulf of Pe-chih-li. The Chinese name for P. A. is Lu-shun Kow, the Eng. name dating from 1861, when one of the leaders of a Brit. naval surveying party was a Lt. Arthur. After the Sino-Jap. war (1894-5) P. A. was occupied by the Japanese, who before their evacuation destroyed all the fortifications. Russia had been strongly opposed to the Jap. occupation, and 2 years later, in 1898, Russia herself obtained from the Chinese Gov. a concession in the Liaotung peninsula, including P. A.,

to which the Russian trans-Siberian railway was extended. Following the Boxer rising and the Russian occupation of Manchuria, Russia turned her attention to an extension of her influence in Korea. The Japanese declared war on Russia, 26 Jan. 1904. At the close of that year P. A. surrendered to the Japanese. Russian losses during the siege amounted to about 5000, and the Jap. to some 60,000. At the subsequent peace concluded at Portsmouth (1905) Russia lost P. A., which became the administrative centre of the Jap. concessions in Kwantung. In Aug. 1945 Russian airborne troops landed on P. A. In 1945 a clause in the treaty between the U.S.S.R. and China laid

section; on the heights are private residences. It has the greater part of the trade of Haiti, but the climate is very unhealthy. The tn is the seat of a Roman Catholic archbishopric, and has a university. Sugar and tobacco are treated in the neighbourhood, and coffee is exported. Pop. 143,000.

Port Augusta, seaport of S. Australia, at the head of Spencers Gulf, Frome co., 210 m. from Adelaide. The dist. has deposits of gold, silver, copper, and coal. There is a woollen and wheat trade, and P. A. is a centre where repairs to rolling-stock are carried out. P. A. was named after Lady Augusta Young in 1852. Pop. 4500.



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down their joint use of P. A. as a naval base for 30 years. China was to conduct the civil administration, and Russia to be responsible for the defence. By the Sino-Russian treaty of 1950 Russia was to hand over the defence of P. A. to China by 1952 or after a peace treaty being signed between China and Japan. This, however, was delayed owing to the Korean War, and the port was consequently handed over to China in 1955.

Port-au-Prince, cap. and chief seaport of Haiti, W. Indies, opposite the is. of Gonaves. It has a fine natural harbour and lies at the farther end of a deep horse-shoe bay, with a small is. protecting the harbour from high seas and tidal waves. The tn is built in the form of an amphitheatre. In the lower quarter of the tn, lying at sea-level, is the commercial

Port Chester, tn in Westchester co., New York, on Long Is. Sound, 26 m. NE. of New York City; it manufs. shirts, stoves, electric razors, hardware, machinery, food products, textiles, chemicals, luggage, and burial vaults. Pop. 24,000.

Port Darwin, see DARWIN.

Port-de-France, see NOUMEA.

Port-de-Paix, tn and port of NW. Haiti, 100 m. N. of Port-au-Prince; it produces coffee. Pop. 6310.

Port Elizabeth, seaport and second city of Cape Prov., S. Africa, on the W. shore of Algoa Bay, 18 m. SE. of Uitenhage. It is of great commercial and industrial importance. The tn of P. E. may be said to date from the arrival of the 1820 settlers, but as a military station it dates back to the end of the 18th cent. Fort Frederick, which overlooks the city, was

built in 1799 and named after the Duke of York. Designed for a garrison of 380 men, and mounting 8 12-pounders, the fort is believed to be the oldest building of Brit. construction in Africa S. of the equator. In 1820, 3423 Brit. settlers were landed in Algoa Bay, whose sandy shores and bleak hillocks were at that time only relieved by a few huts clustering around the blockhouse of Fort Frederick. The fn was at once laid out by order of the acting governor of the Cape, Sir Rufane Donkin, and a stone pyramid, seen on the hill near the lighthouse, was erected by him in memory of his deceased wife, Lady Elizabeth, 'one of the most perfect of human beings, who has given her name to the town below.' The geographical position of P. E. makes it a most important export and import gateway of the Union of S. Africa. It has risen to be the leading industrial city in the country, with a magnificent harbour, which is equipped to handle any type of freight, including locomotives, double-decker buses, etc. There are some 400 industrial undertakings in the city, producing over £22m. of goods annually and paying wages of over £5m. per annum. It is the largest wool-exporting port in the country, and wool brokers handle the greater part of the entire S. African wool clip. It is a leading citrus export centre with special pre-cooling facilities at the docks. The city is a premier footwear manufacturing centre of S. Africa. Both the General Motors and the Ford factories are estab. in P. E. and are the largest assembly plants for motor-cars in the country. The Firestone factory and the General Tyre and Rubber Company are 2 of the largest tyre firms in S. Africa; other ancillary industries to the motor industry include the manuf. of batteries, glass, and electric-light bulbs. P. E. has a number of fine modern municipal buildings, and Rom. Catholic and Anglican cathedrals. There is a world-famous snake park, and the unique Addo National Park is situated 32 m. from the city. P. E. has greatly advanced in importance since 1939. Pop.: Whites, 83,181; Coloureds, 46,113; Bantu, 78,953; Asiatics, 4276.

Port Ellen, tn of the Hebrides, on SE. coast of Islay, Argyll, Scotland, a port and seaside resort with a whisky-distilling industry. P. E. airfield is 5 m. NNW.

Port Florence, *see* KISUMU.

Port Glasgow, burgh (since 1668) of Renfrewshire, Scotland, on the S. shore of the frith of Clyde, 20 m. WNW. of Glasgow. It has a world-wide reputation for ship-building and ship-repairing. Other industries include iron and brass foundries, textile, rope, plastic, and needle manufacturing. Pop. 21,612.

Port Hudson, vil. on the I. b. of the Mississippi R. in E. Baton co., Louisiana, famous as a confederate stronghold in the Amer. civil war. Gen. Gardner, commanding the garrison, succeeded in holding out until Vicksburg capitulated (4 July 1863). P. H. surrendered on 8 July, together with its garrison of 8000.

Port Huron, port and lake resort, co. seat of St Clair co., Michigan, U.S.A., on the St Clair R. near Lake Huron and about 55 m. N.E. of Detroit. It is connected with Sarnia, Ontario, across the riv. by bridges and tunnel. It has railway shops, shipyards, and grain elevators, and manufs. copper, brass, and other metal products, automobile parts, paper, and salt. Pop. 35,700.

Port Jackson, magnificent natural harbour, on one of the coves of which, on the S. shore, was founded the city of Sydney, New S. Wales, Australia. It is an inlet about 18 m. long and has an area of about 21 sq. m. The so-called Parramatta R. is really the largest arm of the harbour or inlet. P. J. was so named by Capt. Cook after Sir George Jackson, one of the secretaries to the Admiralty. Cook, however, does not seem to have discovered its potentialities, having in fact only passed near it and landed in Botany Bay, 6 m. to the S. It was the site chosen for the foundation of Sydney by Capt. Phillip, who transferred the people under his command from Botany Bay, which he regarded as unsuitable for settlement, to near the site of the present city of Sydney (26 Jan. 1788).

Port Kembla is in New S. Wales, Australia, about 50 m. S. of Sydney. It is the port of the southern coalfields and for the extensive industrial area in the vicinity of Wollongong (q.v.). In volume of trade it ranks third in the state. The largest iron- and steel-producing plant in Australia is located at P. K. It constitutes part of the city of greater Wollongong.

Port Lincoln, tn on the W. shore of Spencers Gulf, S. Australia. It is the main port for Eyre peninsula, and is a popular tourist resort. Pop. 4100.

Port Louis, or Isle of France, fort. tn and cap. of Mauritius, on the W. coast. It stands in an excellent harbour, and is the only commercial port of the is., exporting coconut oil, sugar, and aloe fibre. All the trade of Mauritius passes through P. L. It is also a coaling station for the Brit. Navy. Pop. 69,500.

Port Macquarie, seaport tn of New S. Wales, Australia, at the mouth of the R. Hastings, a popular holiday resort. Pop. 4580.

Port Mahon, *see* MAHÓN.

Port Melbourne, formerly called Sandridge, port of Melbourne, Australia. Pop. 13,500.

Port Moresby, important port of entry and cap. of Papua. It has grown rapidly since New Guinea became an Australian mandate. There are regular steamboat services to Sydney. There is a wireless telegraph station and a supreme court. It was frequently raided by Jap. bombers in the Second World War. There are copper deposits in the vicinity. Exports gold, rubber, and coffee. Pop. 3500. *See also* PAPUA.

Port Nolloth, seaport of Cape Prov., S. Africa, 50 m. SE. of the Orange R.; it exports copper and is a railway terminus. Fabulous deposits of diamonds are re-

ported along the coast, but digging is severely restricted. Pop.: Whites, 460; others, 1500.

Port of London Authority, body empowered under the Port of London Act, 1908, to control the docks and shipping of the Thames from the Isle of Sheppey to Teddington, where the riv. comes under the jurisdiction of the Thames Conservancy. The Act thus created a public trust to take over and administer as one unit all the docks and the whole of the tidal portion of the riv. The Act was the outcome of the report of a royal commission appointed some years previously to inquire into the whole subject of London's port facilities. For a long time disputes had been frequent between dock proprietors and lightermen and wharfingers, who used the quays, but claimed exemption from liability to pay towards their upkeep. The P. L. A. took over the docks from companies at a capitalised value of £23m. It was granted powers to impose dues on imports and, to a certain extent, on exports, but care was taken that there should be no duties on goods brought in from other countries intended for re-export, in view of the importance of developing the business of transhipment. The P. L. A. is responsible for the extension and upkeep of the docks, for dredging the riv., and for the orderly control of traffic. It consists of 28 members, 10 of whom are appointed, the remaining 18 elected. The Admiralty appoint 1 member, the Ministry of Transport 2, the L.C.C. 4, the City of London Corporation 2, and Trinity House 1. The other 18 members are elected by the payers of port dues and charges, wharf-owners, and the owners of riv. craft. The Authority have power, if they think fit, to appoint a chairman and a vice-chairman who is not an appointed or elected member of the Authority. The members, who are men of business and technical experience, hold office for 3 years and are unpaid. The P. L. A. is self-supporting and enjoys no subsidies. The Authority's revenue is derived solely from dues and charges for the accommodation provided for vessels and goods and for services rendered. There are no shareholders in the usual meaning of the term. Holders of port stock receive fixed rates of interest. The P. L. A. controls 35 m. of deep-water quays, 150 m. of railway lines, and an enormous acreage of warehouses, transit sheds, and vaults. When the Authority first took over its duties in 1909 a series of comprehensive programmes for the improvement of the riv. and docks was undertaken, including the provision of adequate riv. facilities, the extension of the areas of the dock systems, the construction of channels and the King George V dock, dry docks, new sheds, refrigerated warehouses, pumping installations to increase the depth of water in some of the docks, floating cranes and grain elevators, etc. A more recent and extensive programme included the complete modernisation of the Royal Victoria Dock, new quays and

warehouses at other docks, electrification of berths, and the provision of improved roads, railways, and equipment. The Authority are neither importers nor exporters of merchandise, but custodians only of the goods they handle. They report upon weight, quality, and condition; sort produce to qualities and marks; open packages for inspection, and perform many other expert marketing operations on behalf of merchants. Foremost amongst the various riv. services which the Authority maintain must be placed the dredging service, which has made and maintains the broad approach channel from the estuary into the heart of the port. There is now a good navigable channel, 1000 ft wide with a general depth of 30 ft at mean low water spring tides, from the estuary to Cold Harbour Point, a distance of about 35 m. Vessels of 7700 tons gross register now proceed as far as London Bridge. Vessels which draw up to 37 ft have used King George V Dock, 40 m. from the sea. This has involved the raising and removal of 47,000,000 tons of material at a cost of £2m. Other services are the Harbour Service which patrols the riv. to control traffic; the Wreck Raising Service, with full equipment of modern plant and experienced divers; the Mooring Service, which has its own plant for laying and overhauling public moorings. The P. L. A. offices are at Trinity Square, London, E.C.3.

Port of Spain, maritime tn of the W. Indies, cap. of Trinidad, situated on the NW. of the is. on the site of the old Indian vil. of Conquerabia, on the shores of the Gulf of Paria. It superseded San José d'Oruna (St Joseph) as the cap. in 1783 during the Sp. tenure of Trinidad. It is one of the finest and cleanest tns in the W. Indies. The streets are well laid out and lighted by electricity, and there are electric trams on the main thoroughfares. There are 2 cathedrals: the Rom. Catholic cathedral, founded in 1816 but opened only in 1832, and Holy Trinity Cathedral, founded 1816 and consecrated in 1823. On the W. side of Woodford Square is the handsome gov. building, or Red House, rebuilt and enlarged in 1903. In this building are the legislative council chamber, the prin. court of justice, and the colonial secretariat. On the N. side of the square are the public library, containing over 25,000 vols., and the tn hall, the latter an interesting example of old Sp. colonial architecture. It contains oil-paintings of Abercromby, Picton, and others celebrated in the annals of Trinidad. The Royal Victoria Institute, destroyed by fire in 1920 and rebuilt in 1922, contains lecture, reading, and recreation rooms; there are a number of spacious parks. The Imperial College of Tropical Agriculture was estab. near P. of S. in 1921. The harbour of P. of S. is safe but shallow. It exports not only all the produce of the is. but also re-exports goods from Venezuela. The prin. exports are copra, rum, petroleum, sugar, asphalt, cocoa, and

coconuts. Angostura bitters are manufactured. Pop. 114,150.

Port Phillip Bay, fine bay on the S. coast of Victoria, Australia. It is about 30 m. long; Melbourne lies at its N. end.

Port Pirie, seaport of S. Australia, on Spencer Gulf, 136 m. NW. of Adelaide. Ore and wheat are exported, and there are smelting works for the Broken Hill silver-lead mines. Pop. 12,500.

Port Royal, seaport on the is. of Jamaica. It is a fort. on with naval dockyards, at the W. point of Kingston harbour. Pop. 1000.

Port-Royal des Champs, former Cistercian convent, 8 m. SW. of Versailles. In the 17th cent. it became the H.Q. of Jansenism (q.v.). In 1709 the remaining members of P.-R. were expelled and the buildings destroyed by order of Louis XV. See A. Arnauld, *Mémoires pour servir à l'histoire de Port-Royal* (ed. B. de la Bruyère), 1742; C. A. Sainte-Beuve, *Port-Royal*, 1901; R. Clark, *Strangers and Sojourners in Port-Royal*, 1932; and H. Loudenbach, *Chroniques de Port-Royal*, 1946.

Port Said, important coaling station and built on the W. bank of the entrance to the Suez canal, with a commodious harbour and discharging basin. It was bombed by Brit. and Fr. forces and temporarily occupied by them in Dec. 1956 (see *SUEZ CANAL*). Pop. 178,000.

Port Seton, E. Lothian, see *COCKENZIE*.

Port Shepstone, port of entry situated at the mouth of the Umzimkulu R. in Natal, S. Africa. Its chief products are sugar and fruits. Immense quantities of marble, varying from deep red to white, as yet unexploited, are situated near P. S. Pop. 4200.

Port Sudan, seaport of Sudan, on the Red Sea, 40 m. N. of Suakin. It exports cotton, gum arabic, oil seeds, and grain. Salt pans here supply the whole needs of the country. There is railway communication to Herber on the Nile. Pop. 60,569 (1200 Europeans).

Port Sunlight, model vil., 3 m. SSE. of Birkenhead, Cheshire, England, founded in 1888 by W. H. Lever (later the 1st Viscount Leverhulme) to house the employees of his soap works. The P. S. soap factory is reputed to be the largest of its kind in the world. The vil. contains 890 houses and includes a church, schools, employees' training centre, hotel, theatre, vil. halls, library, open-air swimming-pool, and shops; also the Lady Lever Art Gallery, built by the founder of P. S. in memory of his wife.

Port Talbot, port, industrial tn, and municipal bor. of Glamorgan, Wales, 7 m. ESE. of Swansea, on the E. tip of Swansea Bay, where the R. Afan enters the Bristol Channel. In 1921 Aberavon and Margam were amalgamated to form the bor. of P. T. At Aberavon is an attractive beach; the Margam area is wooded, and there are remains of a Cistercian abbey with ruins of the chapter-house and other 12th-cent. buildings. The nave of the abbey church now forms the par. church. Picturesque Margam Castle and the

adjoining Orangery are modern. The bor. is highly industrialised, and there are important manufs. of steel strip (Steel Co. of Wales), copper and iron, and coal mines. The port has modern equipment. Pop. 46,000.

Port Tampa, seaport of Florida, U.S.A., in Hillsborough co., on the peninsula separating Old Tampa Bay from Hillsborough Bay. It is the deep-water port for Tampa (q.v.), 9 m. NE. There are oil and coal bunkers, and the chief exports are phosphates and lumber. Pop. 1497.

Port Wine, fortified dessert wine, mainly deep red, though white when made from white grapes, exported over the bar of Oporto (q.v.), its name guaranteed by treaty. It owes its origin to the enterprise of Brit. shippers who converted the harsh wines of the Douro into wines acceptable to the Eng. palate, when in the 18th cent. the breach with France cut off the supply of Fr. wines (see *METHUEN TREATY*). The P. W. dist. in the Alto Douro some 50 m. above Oporto slopes down precipitously to the riv., and the cliffs of the valley are covered with terraces for the vines. The stony soil consists mainly of clay schist and granitic material. The vines are pruned low, with the fruit close to the ground. The grapes are trodden in *lagares*, stone presses, where the must ferments until the desired balance between sugar and alcohol is reached, when the wine is drawn off on sufficient brandy to arrest fermentation. The natural Douro wines first exported to this country were harsh and unpalatable, because the grapes are so rich in sugar and the climate so hot that the must ferments right out if left to itself, leaving not a trace of sugar. In the spring the wine is brought down to the Oporto Lodges, where in the case of wood P. it is blended with the wines of past years in reserve so as to maintain for the shipper a uniform standard of type. Vintage P., the wines of a single good year, remain in wood in the lodges for 2, or occasionally 3, years before being shipped to be bottled in England, and mature for many years in the bottle. Good natural table wines are now made on the Douro, thanks to improved methods of vinification. See H. Warner Allen, *Sherry and Port*, 1952; R. A. Cockburn in *Wine* (ed. A. Muir), 1953; P. W. Sandeman, *Port and Sherry*, 1955.

Port Winston Churchill, name given to Arromanches, Normandy, where allied troops landed on 6 June 1944.

Porta, Baocio Della, see *BARTOLOMEO DI PAGHOLO DEL FATTORINO*.

Porta, Giambattista della, see *DELLA PORTA*.

Portadown, bor. of co. Armagh, N. Ireland, on the R. Bann, 25 m. SW. of Belfast. P. has many industries, including the manuf. of linen, lace-making, canning, carpets, pottery, bacon curing, metal boxes, furniture, flour mills, and boots; it is the H.Q. of apple-growing and rose-cultivation in the co. Pop. 17,300.

Portage la Prairie, city in Manitoba, Canada, 56 m. W. of Winnipeg, on the

Canadian Pacific Railway; it has railroad shops, brick plants, hemp and threshing-machine factories, grain elevators, and flour and lumber mills. Pop. 10,374.

Portal of Hungerford, Charles Frederick Algernon, first Viscount (1893-), army officer and Marshal of the R.A.F., educ. at Winchester and Christ Church, Oxford. Served in the First World War (1914-18); commanded the Brit. garrison in Aden, 1934-5; instructor, Imperial Defence College, 1936-7; director of organisation in the Air Ministry, 1937-8; air member for personnel on the Air Council, 1939-40; commander-in-chief of Bomber Command, 1940; air chief marshal and chief of air staff from 1940 to 1946.

Portal of Laverstoke, Sir Wyndham Raymond Portal, first Viscount (1885-1949), industrialist and administrator, educ. at Eton and Christ Church, Oxford. As one of the commissioners of 1934 he recommended that varied industries were needed in S. Wales, with new financial institutions to start fresh undertakings, and administered all the funds devoted to this purpose. He became regional commissioner for Wales in 1939, and later chairman of the coal production council (1940). As minister of works he became well known, especially for the P. house (prefabricated), which aroused both interest and criticism. From 1942 to 1943 he was minister of works and planning.

Portal Vein, see CIRCULATION OF THE BLOOD.

Portalegre: 1. Dist. of E. Portugal, in Alto Alentejo prov. (q.v.). It is bounded on the E. by Spain, and on the N. by the Tagus. Area 2358 sq. m. Pop. 197,000.

2. Tn. of Portugal, cap. of P. dist., 100 m. ENE. of Lisbon (q.v.). It stands on the W. slope of the Serra de São Mamede, near the Sp. border, and has a 16th-cent. cathedral. There are textile, distilling, and cork industries. Pop. 12,400.

Portaña, Vicente Lopez y, see LOPEZ.

Portarlinton, mkt tn of Leix co., Rep. of Ireland, on the R. Barrow, 40 m. WSW. of Dublin. Sev. families of Fr. Protestant refugees settled there in 1685. The P. power station is turf-fired. Pop. 2250.

Portchester, easternmost suburb of Fareham, Hants, England, 4 m. NNW. of Portsmouth. P. was the *Portus Castra* of the Romans, and the Rom. bastioned wall is well preserved. In an angle of the wall is a castle (1160-72); here Henry V. assembled his forces for the Agincourt expedition. The priory church was founded in 1133. Pop. 2300.

Porticulis (Fr. *porte*, gate; *coulisse*, groove), in medieval castles, a strong grating of iron or timber, constructed to slide up and down in grooves cut in the sides of a gate-tower, to repel assaults. Used from Rom. times onwards.

Porte, or Sublime Porte, name applied to the Ottoman court and gov. in the days of the Turkish Empire, derived from an Arabic word meaning 'gate' which the Fr. translated as *porte*, in which form it passed into Eng. speech.

Porter, Eleanor Hodgman (1868-1920), Amer. novelist, b. Littleton, New Hamp-

shire, daughter of Francis H. Hodgman. She studied music, and at 24 married John L. Porter. Among her early novels was the cheerfully sentimental *Miss Billy*, 1911, which had 2 sequels, but her greatest success was with *Pollyanna*, 1913, the story of a girl who plays the 'glad game' of finding something to be glad about whatever happens. It sold over a million copies, and was followed by *Pollyanna Grows Up*, 1915. Others of her novels are *Just David*, 1916, *Dawn*, 1919, and *Sister Sue*, 1921.

Porter, Endymion (1587-1649), Royalist and groom of the king's bedchamber, b. Gloucestershire, was a devoted follower of both Charles I and Buckingham. He accompanied the king (then Prince of Wales) to Spain in 1623, and was employed on diplomatic missions. He took a leading part in the enterprise of Wm. Courten to gain a footing in Madagascar, which ended in disaster. See life by Dorothea Townshend, 1897.

Porter, Gene Stratton (1868-1924), Amer. novelist and nature writer, b. Hopewell, Indiana, her maiden name being Stratton. In 1886 she married Charles D. Porter, a chemist, and they lived in a cabin on the edge of a swamp called the Limberlost. Mrs. Porter explored it for nature articles, and made it the background of her novels *Freckles*, 1904, which sold over 2,000,000 copies, and *Girl of the Limberlost*, 1909. In 1911 she pub. *The Harvester*, based on her father's personality, and in 1913 *Laddie*, an idealised portrait of her brother Leander, who was drowned at 18 years of age. Later pleasantly sentimental novels were *Michael O'Halloran*, 1915, and *A Daughter of the Land*, 1918. She was killed in a motor accident. See J. S. P. Meehan, *Lady of the Limberlost*, 1928.

Porter, Jane (1776-1850), novelist, b. Durham. Taken as a child to Edinburgh, she was regaled with old-world tales by Walter Scott (q.v.), who was a frequent visitor at her home. After moving to London she wrote *Thaddeus of Warsaw*, 1803, a historical novel which went through a dozen eds., and followed it with *The Scottish Chiefs*, 1810, the story of William Wallace's life, which has always been very popular with Scottish children.

Porter, Katherine Anne (1894-), Amer. short story writer, b. Indian Creek, Texas. Educ. at convent schools, she made writing her life's work, but set her standard so high that her output is comparatively small. Vols. of her stories are *Flowering Judas*, 1930, *Hacienda*, 1934, *Noon Wine*, 1937, *Pale Horse, Pale Rider*, 1939, *The Leaning Tower*, 1944, and *No Safe Harbour*, 1949. Her work has been compared with Katherine Mansfield's (q.v.). In 1933 she married Eugene Pressly, and after their divorce Albert R. Erskine, Prof. of Eng. at Louisiana Univ. See E. Wilson, *Classics and Commercials*, 1951.

Porter, W. S., see HENRY, O.

Porter, a beer of a dark-brown colour and bitterish taste, brewed from malt partly worted or browned by drying at a

high temperature, very popular in the 18th and 19th cents. in England, particularly in London. *See also* BREWING.

Port'ercole, *see* ARGENTARIO.

Porteus, John (d. 1736), capt. of the city guard of Edinburgh; gave his name to the 'P. riots.' At the hanging of a smuggler, Wilson, P. and his soldiers fired on the mob, killing 6. For this P. was tried and condemned to death. He petitioned for a reprieve, but was executed on the gallows by a body of men in disguise, who dragged him forcibly from prison. P. and his wife figure in Scott's *Heart of Midlothian*.

Porteawli, urb. dist. and seaside resort of Glamorgan, Wales, 7 m. W. of Bridgend, with a fine golf course. Pop. 9530.

Portici, It. tn. in Campania (q.v.), on the Bay of Naples (q.v.), 4 m. S.E. of Naples. It is on the slopes of Vesuvius, and the ruins of Herculaneum (q.v.) are near by. The 18th-cent. Royal Palace is now used by the University of Naples. There are fish and silk industries. Pop. 35,800.

Portico, a roofed space, open on one side at least, and enclosed by a range of columns, which also support the roof. A P. usually forms part of a building, but may stand free.

Porticus (Lat., plural *porticus*), a small porch, built on both N. and S. sides of some Eng. pre-Conquest churches, and thus forming rudimentary transepts.

Portimão, tn of Portugal, in Faro dist., 34 m. WNW. of Faro (q.v.), on the Atlantic coast. It is a seaport on the estuary of the P. riv., and is an important fishing and canning centre. Pop. 9900.

Portioners, in Scots law, the equivalent of the Eng. co-parceners (q.v.) or female heirs-at-law.

Portions, term used to denote the pecuniary provision made in a 'strict settlement' of real estate for the younger children of the marriage. The machinery for raising P. is to vest the property in trustees for a number of years with power to sell so much as may be necessary to produce the specified amount (*see also* HATCHPOST). In practice, the tenant-in-tail usually raises the money in whatever mode is most convenient to him, and on doing so the trustees and younger children join in surrendering the term of years vested in the trustees to him. *See* LAND LAWS.

Portishead, holiday resort of Somerset, England, 8½ m. WNW. of Bristol on the Severn estuary. Pop. 5000.

Portland, Earls and Dukes of, *see* BENTINCK.

Portland: 1. Largest and chief commercial city of Maine, U.S.A., co. seat of Cumberland co., 150 m. N.E. of Boston, on Casco Bay, an inlet of the Atlantic Ocean. P. is a rail centre, and also possesses excellent shipping facilities, with a harbour of c. 8.5 m. frontage that handles 2,500,000 tons of goods annually. Manufactures include paper, cellulose, and clay products, marine hardware, shoes, furniture, steel, and explosives; printing and publishing, fishing, food packing, lumber,

and petroleum distribution are also important. Points of interest are the Longfellow home, the Sweet Memorial Art Museum, P. Soc. of Natural Hist. and Maine Historical Soc. museums, and P. Observatory (built 1807). P. is the site of 2 junior colleges, St Joseph's College, Maine General Hospital, and schools for the deaf and blind. The city has many beautiful homes in the Greek-revival style. P. was first settled in 1632, when it was known by the Indian name of Machigonne; it was burnt by the Brit. in the Revolutionary War, but rebuilt a few years later. It was the cap. of Maine from 1820 to 1831. Pop. 77,634.

2. Largest city of Oregon, U.S.A., co. seat of Multnomah co., on the Willamette R. about 110 m. (riv. distance) from the Pacific coast. It lies on both sides of the riv., and is connected by sev. fine bridges. The busiest part of the city is on the W. side of the riv., where the streets run parallel, but the rest of the city is built on a regular plan, the streets crossing each other at right angles. P. has an extensive harbour and good commercial advantages, and a large trade is carried on in lumber, grain, paper, wool, flour, livestock, meat, canned and frozen foods, and other merchandise. P. was founded in 1845. There are fine views from the higher parts of the city of Mt Rainier and Mt Hood. Public buildings include the medical and law depts of the Univ. of Oregon, P. Univ. (Rom. Catholic), Reed College, Lewis and Clark College, and Cascade College. P. has a municipal airport. Pop. 373,628.

Portland, Battle of, fought in 1653 between an Eng. fleet under Blake, Deane, and Monck and a Dutch under Tromp, De Ruyter, and Evetjen. It resulted in a victory for the Eng., but the losses on both sides were heavy.

Portland, Isle of, peninsula of the coast of Dorset, England, 4½ m. in length, connected with the mainland by the Chesil Bank. It is known for its Borstal Institution (formerly prison), penal estab. (formerly military barracks and fortress), harbour of refuge, and building stone. It contains P. castle, built by Henry VIII in 1520, and an anc. fortress ascribed to Wm Rufus. Pop. 15,840.

Portland Beds, of the Upper Jurassic Oolites, underlying the Purbeck Beds and resting on the Kimmeridge Clay, consisting of a lower sandy series, and Portland Sand, and an upper limestone series, the Portland Stone. They attain a thickness of about 240 ft on the Dorset coast (Isle of Purbeck), and are of economic importance for building stone. Gastropods, lamellibranchs, and ammonites, the latter of enormous size, are the prin. fossils.

Portland Canal, fjord on the W. side of N. America which forms the boundary between extreme S.E. Alaska and Stewart, Brit. Columbia. It is 70 m. in length, and is bordered by mts varying from 3000 to 7000 ft in height.

Portland Stone, a subdiv. of the Portlandian Series of rocks which forms part of the Upper Jurassic. The P. S. in Dorset

consists largely of a limestone packed with fossil shells. It is widely used as an ornamental building stone.

Portland Vase, exceptional specimen of Rom. art, made of dark-blue glass ornamented with figures in relief in white opaque glass. It is 9½ in. high and 7½ in. in diameter. By tradition discovered in a sarcophagus at Monte del Grano, near Rome, in the 17th cent., it was placed in the Barberini Palace, and purchased by Sir William Hamilton in 1770. He sold it to the Duchess of Portland for 1800 guineas, and in 1810 it was lent to the Brit. Museum, where it was broken by a maniac in 1845. It was skilfully repaired, and in 1929 put up for sale at Christie's but withdrawn after the bidding had reached 29,000 guineas. After having been on loan for 136 years, it was sold to the Brit. Museum in 1946. Josiah



British Museum

PORTLAND VASE

Wedgwood (q.v.) made a copy of it in a blue-black jasper stoneware in 1790, but of the 50 copies thought to have been made in his lifetime, only 16 now exist. See W. Mankowitz, *The Portland Vase*, 1953.

Portlaoise or (formerly) **Maryborough**, co. tn of Leix co., Rep. of Ireland, situated on a small trib. of the R. Barrow, 50 m. SW. of Dublin. It has sev. good public buildings, including a mental hospital, a State prison, and the co. infirmary. There are woollen manufs. and flour mills. Pop. 3336.

Portmadoc, urb. dist. and seaside resort of Caernarvon, N. Wales, close to Snowdonia. With its suburbs of Tremadoc, Borthygast, and Morfa Rychan it forms

a compact residential and holiday dist. Pop. 4000.

Portmarnock, seaside resort, 9 m. NE. of Dublin, Rep. of Ireland, famous for its velvet strand and championship golf course.

Portmeirion, baroque seasonal holiday resort, designed by the architect Clough Williams-Ellis, on a private sub-tropical headland overlooking Tremadoc Bay, Merioneth, N. Wales.

Porto, dist. of N. Portugal, in Douro Litoral prov. (q.v.), bounded on the N. by the Ave, on the W. by the Atlantic, and on the S. by the Douro. Its cap. is Oporto (q.v.). Area 881 sq. m. Pop. 1,053,000.

Porto Alegre, city of Brazil, at the mouth of the Jacui, on the NW. extension of the Patos lagoon. It is the cap. of the prov. of Rio Grande do Sul, is a bishop's see, and contains a cathedral and other important buildings. It has 2 univs. The harbour has been much improved by land reclamation work. Textiles, chemicals, and food products are manufactured, and cattle, salted pork and beef, wool, cereals, tobacco, and yerba maté are exported. Many new buildings, both commercial and residential, have been built on the reclaimed land, and P. A. is now one of the most modern cities in Brazil, with 2 civil airports. Ocean liners call at P. A., and there is a large riv.-trade with the agric. colonies in the N. of the prov. Pop. 382,000.

Porto Bello, or **Portobello** (Sp. **Portobelo**), tn in the central Amer. rep. of Panama, on the isthmus of Panama, in Colón prov., on P. B. Bay. The present tn, built in 1584, occupies the site of a colony estab. by Columbus, Nombro de Dios (1502). It was sacked by Drake in 1572, by Henry Morgan in 1668, and by John Spring in 1680. It was captured more than once by the English, Adm. Vernon taking it in 1739. It lies at the end of an old paved road to Panama along which gold was brought for shipment. Pop. 600.

Porto Cristo, see **MANACOR**.

Porto d'Anzio, see **ANZIO**, **PORTO D'**.

Porto Empedocle, seaport of the prov. of Agrigento, Sicily, 3 m. SSW. of Agrigento (q.v.), for which it is the port. It exports sulphur and other commodities. Pop. 13,850.

Porto Grande, or **Mindello**, tn on the NW. side of St Vincent, Cape Verde Is. It has an excellent harbour, and is a coaling station.

Porto Marghera, see **VENICE**.

Porto Maurizio, see **IMPERIA**.

Porto Novo: 1. Tn on the Coromandel coast, Madras state, India, 30 m. S. of Pondicherry, and the scene of the defeat of Hyder Ali in 1781. P. N. was originally an early Portuguese settlement, then fell to the Dutch and finally (1690) the Brit.

2. Cap. of Dahomey, W. Africa, & Fr. possession. P. N. is linked by railway with other parts of Dahomey and with Lagos by internal waterway. Pop. 30,400.

Porto Praia, see **PRÁIA**.

Porto Rico, see **PUERTO RICO**.

Porto San Stefano, see **ARGENTARIO**.

Portobello, Scottish seaside tn, part of the city of Edinburgh (q.v.), on the S. shore of the Firth of Forth. According to tradition, the name was given to it by one of Adm. Vernon's seamen who was present at the taking of Porto-Bello in Central America.

Portoferraio, or **Porto Ferrajo**, It. tn, in Tuscany (q.v.), the chief tn of the is. of Elba (q.v.). It is on the N. coast, and was severely damaged during the Second World War. The 2 houses used by Napoleon (see **NAPOLEON I**) during his exile still exist, and there is a mask of him in the Misericordia church. The harbour is used by fishing and trading boats. Pop. 7600.

Portogruaro (Rom. **Julia Concordia**), It. tn, in Veneto (q.v.), on the Lemene, 34 m. N.E. of Venice (q.v.). It has anc. streets and a beautiful cathedral. The Rom. colony of *Concordia Sagittaria* was near by. Pop. (tn) 9300; (com.) 21,900.

Portomaggiore, It. tn, in Emilia-Romagna (q.v.), 13 m. S.E. of Ferrara (q.v.). It suffered much damage during the Second World War. Pop. 26,200.

Portoviejo, cap. of Manabí prov., W. Ecuador (q.v.), on the R. P., 105 m. from Guayaquil and 400 m. from Quito. Hats and baskets are made and tropical produce grown. P. is the seat of a bishopric. Pop. 18,100.

Portraiture, art of reproducing the likeness, real, idealised, or conventional, of someone by artistic means. This is of very anc. origin, and is to be found in the anc. Assyrian, Egyptian, and Gk civilisations, though among these it generally took the form of sculpture. Apollodorus, the Gk painter, was the first to reproduce light and shadow in P. The painted mummy cases are some of the earliest examples of portraits in the modern sense of the word. In Pompeii sev. portraits in fresco have been found, and Rom. portraits from the 2nd cent. AD were painted with coloured wax, laid on to thin pieces of wood in solid bodies of the same tint, and were cut to fit on mummy cases. Examples of this P. have survived from the tombs of Alexandria, together with a small framed portrait. Much Rom. P., as with earlier peoples, consisted of busts and statues. The portrait busts from Ife in Africa will stand comparison with the best classical work, which they vividly recall. Giotto reintroduced P. into painting (e.g. Dante), although Cimabue before him is said to have painted St Francis 'from nature.' Breaking away from the conventions of M.S. painting, Fra Angelico in his paintings introduced figure portraits of Pope Nicholas V and the Emperor Frederick. Gozzoli, his pupil, in *The Journey of the Magi*, painted a picture composed of contemporary portraits. In many religious paintings portraits of the donors appear. The art of P. is to be found in figure-painting. Hogarth, in *The Rake's Progress*, also portrayed his

contemporaries. In P. proper, however, the persons are represented for their own sake, and on design and the placing of the sitter the success of the portrait depends. Two early portraits are Richard II in Westminster Abbey, and King John II of France, painted by Gérard d'Orléans in 1359. By the end of the 14th cent. P. was becoming a separate art in N. Europe, and was further developed by J. Van Eyck, Albrecht Dürer, and Hans Holbein (15th and early 16th cents.). Roughly speaking, the earlier painters were concerned with the exact delineation of features, and the profile view was often favoured as showing them most characteristically. The Renaissance brought a new variety of pose and power of modelling into P., and those who painted the great (like Titian) were also able to invest the work with a suitable air of dignity and grandeur. Rubens and Van Dyck were not slow to learn the lesson, and their influence continued in the Eng. school through Reynolds, Gainsborough, Lawrence, and Raeburn. Rembrandt, who knew the painting of Rubens, and who studied Titian and Tintoretto, stands in a class apart. None, with the exception of Titian, stands near him. Rembrandt's insight into the minds and characters of his sitters, whether young or old, is beyond all others, and it was reinforced by a richly elaborate technique.

Every European country has given us outstanding portraits, and a list of masterpieces would be one of largely personal choice. It might include Rubens's 'Hélène Fourment,' Velazquez's 'Philip IV,' Hals's 'Gypsy Girl,' Goya's 'Dr Peral,' Renoir's 'Jeanne Samary,' Whistler's 'Portrait of the Artist's Mother,' and Van Gogh's 'Arlésienne,' but this is a small and arbitrary choice. The pastels of La Tour and Chardin, the miniatures of Holbein, Hilliard, and Oliver, also call for attention, as well as oil-portraits.

Modern portrait painting shows a decline as a professional speciality. Photography has been a serious rival in the field of 'likeness' and has taken the edge off that side of the portrait-painter's art. Many of the conventions of portrait painting have worn thin, and some fields have been exhausted by the great painters, as Rembrandt or Van Dyck. The state portrait is a thing of the past, and the technique dead. Sitters are sometimes treated rather as still-lives (the influence of Cézanne). On the other hand, Augustus John is a living master who has added some great portraits to the list of masterpieces, and the exquisite portraits of his sister Gwen John deserve special mention. A fine example of free and unconventional portraiture is the 'Victor Lecour' of Walter Sickert. Such present-day painters as Rodrigo Moynihan (with, e.g., his large group of Penguin editors, 1955), Robert Buhler, and Ruskin Spear show the living aspect of the art. The bronze portrait busts by Epstein are a great contemporary contribution. See W. Wätzoldt, *Die Kunst des Porträts*,

1908; B. Johnson, *Figure Drawing and Portraiture*, 1931; R. H. Goodall, *Guide to Successful Portraiture*, 1933; H. Murray, *Portrait Painting in Oils*, 1936; W. Hager, *Meisterbilder der Dürerzeit*, 1942; K. Sohefeld, *Die Bilder der antiken Dichter, Redner und Denker*, 1943; J. Erith, *Erith on Portraiture*, 1948; M. J. Friedländer, *Landscape, Portrait, Still-life*, 1949; H. Carr, *Portrait Painting*, 1952. See also PAINTING; MINIATURE PAINTING; NATIONAL GALLERIES; NATIONAL PORTRAIT GALLERIES; and articles under countries and individual painters.

Portree, tn and par. of Skye, Inverness, Scotland, on E. coast of is. It has a wool-len industry and is a growing tourist centre. Pop. 1767.

Portrush, seaside resort of co. Antrim, N. Ireland, 8 m. W. of the Giant's Causeway (q.v.). Pop. 4200.

Portsea Island, is. off the coast of Hants, England. It lies between Portsmouth harbour and Langstone harbour, 2 inlets of the Eng. channel; the SW. part of the is. is occupied by the great naval station of Portsmouth, Portsea, Landport, and Southsea.

Portslade-by-Sea, seaside tn 4 m. from Brighton, Sussex, England. It has a polish-manufacturing works and a mineral-water factory, and a few light industries. Pop. 13,500.

Portsmouth, Earls of, are of a family called Wallop, said to have settled in Hants before the Conquest. John (1690-1762) ingratiated himself with the Hanoverians and became Baron Wallop and Viscount Lymington, 1720, and first earl of P., 1743. The 4th earl took the name Fellowes. The 5th reverted to Wallop. His son, Newton (1856-1917), was a Liberal M.P. from 1880 till he became 6th earl in 1891; he was under-secretary for war, 1905-8. The 9th earl (b. 1898) succeeded to the title in 1943.

Portsmouth, important city, seaport, and naval station covering Portsea Is. and extending to the mainland of Hants, England, 74 m. SW. of London. On the opposite side of the harbour is Gosport (q.v.). P., which was made a city in 1926, includes Landport, Portsea, Southsea, and Cosham, together with the more recently developed areas of Paulsgrove and Farlington. The harbour has a narrow entrance, but afterwards expands into a basin 4 m. by 2 m. It is spacious enough to accommodate a large part of the R.N. and to float the heaviest ship in it. It is the premier naval port of the Commonwealth. The dockyard covers an area of nearly 300 ac., has 12 docks ranging in depth from 21 to 36 ft, dry docks, building slips, a school of naval architecture, and many estabs. connected with the production of the requirements of the Navy. The old *Victory*, Nelson's flagship, was moored in the harbour until 1920. In 1923 she underwent a thorough restoration, and is now permanently berthed in the oldest dry dock in the world. In 1923 the torpedo school (H.M.S. *Vernon*) was transferred from old ships to new buildings on the Gun wharf.

At Whale Is. (H.M.S. *Excellent*) there is a great gunnery school; on the E. of Portsea Is. are the Tipner magazine and barracks; the Eastney Royal Marine barracks lies at the E. end of Southsea, which is a popular holiday resort with 2 piers. The business of Southsea is largely devoted to the interests of the hotel and catering industry for the many visitors who come annually to enjoy the amenities. From the 5 m. of sea-front fine views can be obtained of the Isle of Wight and the famous Spithead roadstead, the scene of important naval reviews. The trade of P. is chiefly connected with the dockyard, the airport and its factories, the building of ships and motor boats, and varied commercial undertakings. In 1924 P. was made the seat of a new diocese of P. and the Isle of Wight, the old church of St Thomas à Becket in High Street, dating from about 1180, becoming pro-cathedral.

Richard Cœur de Lion granted P. its first charter in 1194. By the opening years of the 13th cent. P. had become a naval station of some importance, the docks, enclosed by a strong wall, accommodating the royal galleys. Its importance as a naval dockyard commenced about 1545; in that year the Eng. fleet assembled at P. prior to the naval engagement with the Fr. off Spithead. It was in P., in 1628, that Felton assassinated the Duke of Buckingham. In 1662 the marriage of Charles II with Catherine of Braganza took place at P. The registers of the cathedral of St Thomas record the marriage, which was celebrated in the Presence Chamber of the Governor's House. Adm. Byng was executed here in 1757, and in 1782 the *Royal George* went down with Adm. Kempenfelt and nearly 1000 men. In Sept. 1805 Nelson and his fleet departed from P. for Trafalgar. Eminent sons of P. include the writers Charles Dickens, Captain Marryat, George Meredith, Sir Walter Besant; the painters W. L. Wyllie, George Cole, and his son Vicat; the engineer Sir Isambard Brunel; Jonas Hanway, the philanthropist; and John Pounds, the crippled cobbler, who devoted himself to the teaching of the poor ragged children of the neighbourhood, and thereby inaugurated the Ragged Schools Union. In June 1948 F.M. Lord Montgomery unveiled a memorial of the departure of the D-Day invasion force. The memorial consists of a block of stone, similar to the road blocks along the Brit. highways in the war. It stands in the garden facing Southsea beach, overlooking the waters through which the D-Day armada sailed on 6 June, 1944.

P. was a very important military target in the Second World War. Of 70,000 buildings, 65,000 suffered some kind of air-raid damage, 6650 being totally destroyed. Amongst the buildings so destroyed were the splendid guildhall, which was gutted by fire in 1941, and a number of old buildings in the historic High Street. The Domus Dei, or Chapel of the Garrison, was badly damaged, but is now used again.

P. had a serious housing problem before the Second World War, and in 1943 the City Council decided to develop a new tn at Leigh Park, Havant, to assist in the 'overspill' problem, estimated at 40,000 persons. This development is proceeding rapidly, and, subject to Ministry approval, additional land is to be acquired to meet the full-scale development forming a major extension to the neighbouring tn of Havant. Whilst every attempt will be made to house the major portion of the city's 'overspill' pop. at Leigh Park, it is considered that further development areas may be necessary. Pop. 245,800.

Portsmouth: 1. Port city of Virginia, U.S.A., on Elizabeth R., in Norfolk co., opposite the city of Norfolk. It has sev. manufs., and near by is the Norfolk navy yard. P. is a rail terminus and steamship port; it ships agric. produce. There are processing industries, and fertiliser, knitted goods, soap, and furniture are manufactured. There are also ship-building yards. Pop. 80,040.

2. City, cap. of Soloto co., Ohio, U.S.A., on Ohio R. (with bridge) at mouth of Soloto R., 90 m. S. of Columbus. It has steel mills, foundries, and makes shoes, furniture, and stoves. A major atomic plant is near by. Pop. 36,800.

3. City and cap. of Rockingham co., New Hampshire, U.S.A., and N. H.'s only seaport, on the Atlantic, 50 m. N. of Boston. The treaty of peace terminating the Russo-Jap. war was negotiated here in 1905. Its greatest prosperity existed before the decline of the W. India and China trade, carried in sailing-ships. It possesses outstanding examples of 18th-cent. Amer. architecture. The navy yard of P. is on 2 ls. in Piscataqua R. opposite the tn, but is included in the tn of Kittery, Maine. P. is a port of entry. It manufs. buttons, shoes, tools, gypsum, and wood products. Pop. 18,830.

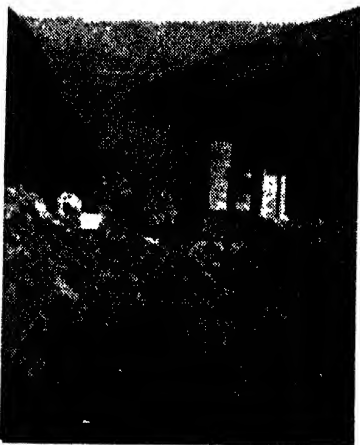
Portsmouth and Aubigny, Louise Renée de Kéroualle, Duchess of (1649-1734), mistress of Charles II of England. She was the elder daughter of Guillaume de Penancoët, sieur de Kéroualle in Brittany, and came to England in the train of the Duchess of Orléans, 1670. In 1672 she bore to the king Charles 'Lennox,' afterwards first Duke of Richmond. In 1673 she was made (*inter alia*) Duchess of P. In 1674 the King of France made her Duchess of Aubigny. She was the agent of Louis XIV, and was the only mistress of Charles who exerted any serious political influence on him, being extremely unpopular in England.

Portstewart, seaside resort of co. Derry, N. Ireland, 5 m. N. of Coleraine. Pop. 3600.

Portugal (República Portuguesa), republic of W. Europe, occupying one fifth of the Iberian peninsula. It is bounded on the N. and E. by Spain, and on the W. and S. by the Atlantic Ocean. In shape it is a parallelogram, its greatest length being 362 m., and its breadth varying between 80 and 140 m. The total area is 35,582 sq. m., which includes the areas of the Azores and Madeira Is. (qq.v.),

high are politically part of metropolitan P.

Geography. P. has a seaboard of nearly 500 m. The coast is low, flat, and unbroken, the only important promontories being capes Mondego, Carvoeiro, Roca, Espichel, St Vincent, and Santa Maria. The prin. mts. are continuations of Sp. ranges. The mts. of Galicia are continued into the Transmontane system (Peneda, 4728 ft.; Marão, 4642 ft.) lying between the Rs. Minho and Douro (qq.v.) in the N. Between the Douro and the Tagus there extend two ranges, the N. including Montemuro (4534 ft.), and the S. the Serra da Estrela (6540 ft.), which is a W. continuation of the Sp. Sierra de Guadarrama (q.v.). S. of the Tagus, and between it and the Guadiana (q.v.) are many isolated mt. masses. The rivs. already mentioned have their sources in Spain. The Mondego, the longest wholly Portuguese riv., rises in the Serra da Estrela, and has a length of 130 m. Much of the scenery of the country is extremely beautiful. The rainfall is heavy, especially in the N., and the climate temperate and equable, except in



Portuguese Travel Agency

CASTLE OF LOUÇÃ (FOURTEENTH CENTURY)
A medieval stronghold on a hill in a valley,
15 miles from Coimbra.

the valleys, where the summer is excessively hot, and fever prevails on account of the swamps and salt marshes. The geology, fauna, and flora of the country differ little from those of Spain (q.v.).

Constitution. Until 1910 P. had a hereditary monarchical form of gov. In that year, after a short revolution, a republic

was estab. Its constitution provided for a bi-cameral legislature under a president elected for four years. In 1933, following the successful rising of the Army against the democratic party in power (May 1926), which led to a new political regime, this was superseded by a new constitution, adopted by plebiscite. This constitution (which has subsequently been amended) provides for an authoritarian republic on a corporative basis. The president is elected for seven years by direct vote of the electors. There is a single-chamber legislature of 120 members elected for four years by direct suffrage. At the elections of 8 Nov., 1953, the União Nacional obtained all 120 seats, the 28 opposition candidates being defeated. A Corporative Chamber also exists, which functions alongside the legislature, and which advises on social and economic affairs. Portuguese constitutional law is hostile to liberal principles. The constitution, however, defines under a score of heads the rights of the Portuguese citizen, some of which are liberal in tendency. Half of them deal with the citizen's ordinary rights before the law (e.g. no arrests without charge; the right to be defended in court, etc.). The rest are the right to good name and reputation; liberty of religious beliefs and practices; freedom in the choice of work or profession, and freedom of association. The liberty of expressing opinions and holding meetings is, however, liable to control by an amendment of the constitution. The gov. maintains a strict hold on any movement which, in its view, is inimical to the national interest or the foundations of the 'New State.' The family, rather than the individual, is the unit of which the state is composed; next comes the guild or corporation. The corporations are not only trade and industrial organisations, but also bodies engaged in science, literature, etc. (see also CORPORATIVE STATE). Within the corporation, employers and employed form a single guild. The representatives of the corporations form the corporative chamber. All Bills and motions, projected treaties and conventions, must be submitted to the Corporative Chamber before being discussed and voted on in the assembly. The ministers are appointed by the president of the republic. They need not be members either of the Corporative Chamber or of the assembly; if they are, they may not sit in their respective chambers during their term of office. The gov. exercises legislative authority to a considerable extent when the assembly is not in session. It depends on the confidence of the president, and its retention of office does not depend on the fate suffered by its Bills or on any vote of the assembly.

Local Administration and Justice. P. is divided into eleven provs.: Algarve, Alto Alentejo, Baixo Alentejo, Beira Alta, Beira Baixa, Beira Litoral, Douro Litoral, Estremadura, Minho, Ribatejo, Trás-os-Montes e Alto Douro (qq.v.). The administrative dists. are as follows: Aveiro, Beja, Braga, Bragança, Castelo

Branco, Coimbra, Évora, Faro, Guarda, Leiria, Lisboa, Portalegre, Porto, Santarém, Setúbal, Viana do Castelo, Vila Real, Viseu, Angra do Heroísmo, Funchal, Horta, Ponta Delgada (qq.v.). Under Portuguese law the four branches of penal, civil, administrative, and fiscal law are distinguished; each branch has its own courts. For judicial purposes the country is divided into 157 *comarcas*. In each *comarca* there is a lower court; in the *comarca* of Lisbon there are 22 lower courts, and in that of Oporto 15. There are three courts of appeal, at Lisbon, Coimbra, and Oporto; and at Lisbon there is a Supreme Court.

Population, Religion, Education, Chief Towns. The pop. of continental P. is 7,856,913, and of the is. 584,399. There is freedom of worship, with the exception of creeds deemed incompatible with morals and the life and physical integrity of the people. Rom. Catholicism is the predominant faith. There are six eccles. provs., with their sees at Lisbon, Braga, Évora, Luanda, Lourenço Marques, and Goa. The Church in P. suffered at the period when it was identified with the unpopular monarchy and aristocracy. A bitter anticlericalism characterised the Liberal political movement of the 19th cent. After the creation of the republic in 1910 the Church was disestab. and its property sequestered. The new order did not bring the expected national regeneration and economic prosperity, and since 1928 there has been a reaction against anti-clericalism. The separation of Church and State was maintained in the 1933 constitution. A Concordat with the Holy See, signed in 1940, restored church property in the possession of the state, except that used for public services or classified as of national interest. Religious marriages are recognised, if notified to the Registrar's office, and divorce is forbidden to parties married by the Church.

Primary education is free and compulsory for children between 7 and 13. According to the census of 1950, 59.6 per cent of the pop. over 7 years of age could read and write. There are over 14,000 elementary schools. There are univs. at Lisbon (1911), Coimbra (1290), and Oporto (1911), and at Lisbon there is also a technical univ. (1930). There were 8900 univ. students in 1950. There are training colleges for teachers in the most important towns, commercial schools, a military and naval college, eccles. seminaries, and colleges for music and art. An institute for pedagogic sciences is to be set up to meet the need for more teachers.

The prin. towns are Lisbon (the cap.), Oporto, Setúbal, Coimbra, Funchal, Braga, Évora, and Ponta Delgada (qq.v.).

Production. P. is predominantly an agric. country: wheat, maize, beans, oats, barley, rye, rice, potatoes, citrus fruits, and figs are grown. Much wine is produced (227,196 hectolitres of port were exported in 1954), and P. is the largest producer of cork in the world. The fishing industry (in particular, sardine fishing centred at Setúbal and Olhão) is im-

portant. The country has much mineral wealth, principally of lead, wolfram, tin, antimony, iron, manganese, salt, and uranium, but valuable mines remain unexploited because of poor communications and lack of electric power. The chief manufs. are of textiles and cork products. *Azulejos*, or porcelain tiles, are made; this anc't industry is a Moorish inheritance, and the tiles are widely used in both the exterior and interior decoration of buildings of all kinds. There are porcelain factories at Sacavém, Vista Alegre, Gaia, and Coimbra. P.'s imports exceed by far her exports; in 1955, according to the Minister of Finance, the Portuguese balance of trade recorded a deficit of 3,290,000,000 *escudos*, which shows an increasing figure of 500,000,000 *escudos* over the previous year.

Communications. There are 2224 m. of state-owned railway lines (of these, 1752 m. are broad gauge and 472 m. are narrow gauge). In 1954 there were 18,100 m. of roads. The merchant marine, in 1955, consisted of 321 vessels, with a combined tonnage of 533,308. Air services connect P. with all parts of the world.

Defence. The army is maintained by conscription, every male citizen being subject to military service from the age of 20 to that of 45 years. Pre-military training is entrusted to the *Mocidade Portuguesa* (Portuguese Youth Movement). In continental P. there are five military regions: Oporto, Coimbra, Tomar, Évora, and Lisbon (which has a military governor). There are also commands at Madeira (Funchal), the Azores (Ponta Delgada), Angola, Mozambique, Cape Verde, Portuguese Guinea, India, Macau, and Timor. The army consists of 16 regiments of infantry, and supporting troops. The navy comprises: 5 destroyers, 8 frigates, 3 submarines, 18 minesweepers, 9 submarine chasers, 1 gunboat, 1 sailing training ship, and smaller vessels. In 1955 the air force comprised 350 aircraft.

Currency, etc. The unit of currency is the *escudo* of 100 *centavos*. When Great Britain devalued the £ in 1949, P. fixed the value of the *escudo* at 80.50 *escudos* = £1 sterling. There are silver coins of 20, 10, 5, and 2½ *escudos*; alpaca coins of 1 and ½ *escudo*; and bronze coins of 20 and 10 *centavos*. The metric system is in general use.

Colonies. The prin. dependencies and colonies of P. are, in *Asia*: Goa, Macau, Timor; and in *Africa*: Cape Verde Is., Principe and St Thomas Is., Guinea, Angola, and Mozambique. The Portuguese empire is the oldest colonial empire in the world. It has an area of over 800,000 sq. m., and a pop. of nearly 11,000,000. Goa (q.v.), in India, became a Portuguese possession in the 16th cent., a result of the wave of missionary and trading enthusiasm then sweeping P. It has an area of 1400 sq. m. In 1954, following a breach of diplomatic relations, the enclaves of Dadrá and Nagar-Aveli were annexed by India, which caused the Portuguese Gov. to take military measures to avert any further aggression.

The largest Portuguese colonies are Angola (q.v.) with 485,000 sq. m. and Mozambique (q.v.) with 297,731 sq. m. These two African dependencies with their harbours, which are regularly used by Brit. shipping, have been developed extensively since 1928. Every effort has been made to utilise their mineral and agric. resources, and communications have been greatly improved. They have important railways which give access to Lobito Bay, Beira, Lourenço Marques, Mafeking, and Komati Port.

History. The early hist. of P. practically coincides with that of the whole of the Iberian peninsula. The sway of Carthage (3rd cent. BC) gave place to that of Rome. Lusitania, comprising that part of P. which lies S. of the Tagus, was formed into a Rom. prov. during the Augustan period, and the country prospered under Rom. rule. From the 4th to the 8th cent. it was overrun by hordes of Alani, Suevi, Visigoths, Saracens, and Arabs in succession, and it was not until the 12th cent. that a kingdom was estab. Ferdinand of Castile and his son Alfonso VI won back the ter. forming the country of P. from the Moors. Alfonso Henrique, grandson of the latter count, maintained throughout his lifetime a state of continual warfare on the Galician frontier. In 1143 he obtained for P. from León and the Holy See the status of an independent kingdom. In 1147 he captured Santarém and Lisbon from the Moors and made the latter his cap. He was succeeded by Sancho I (1185-1211), who was engaged during the earlier part of his reign in war with the Moors and with Alfonso IX of León, and later, by his encouragement of local self-government, won for himself the title of *O Povoador* (founder of cities). He opposed the claims of Innocent III, but in 1210 submitted to papal authority. Alfonso II, the Fat (1211-23), is notable as the first king to summon the Portuguese cortes. Sancho II (1223-48) drove the Moors from Alentejo, and won many successes in Algarve. He was forced to abdicate in favour of his brother, Alfonso III (1248-79), who proclaimed himself *rei* (king). He extended his kingdom to Algarve, and strengthened it by marrying the daughter of Alfonso X of León and Castile. Thus the kingdom of P. reached its present European boundaries.

Dinis (1297-1325) devoted himself to the constitutional and social reconstruction of the kingdom. He encouraged agriculture, industrial arts, commerce, and maritime enterprise, and was a patron of learning, founding the present univ. of Coimbra in Lisbon in 1290, established in Coimbra in 1307. He negotiated a commercial treaty with England (1294) and formed a royal navy. Alfonso IV (1325-57) was chiefly occupied in wars with the Castilians and Moslems, while his successor, Pedro I, the Cruel (1357-67), endeavoured to lessen the tyranny of the nobility and clergy. The claim of Ferdinand (1367-85) to the throne of Castile was contested by Henry of Trastámara. Ferdinand allied himself with the Aragonese

and Moors and with England. On his death the Burgundian line came to an end, and the cortes asserted its right to elect the new king, choosing John I (1385-1433), an illegitimate brother of Ferdinand, and the first of the house of Aviz. In 1385 the united Portuguese and Eng. forces defeated the Castilians at Aljubarrota. The Anglo-Portuguese alliance was confirmed by the treaty of Windsor (1386); and John cemented the friendship between the 2 countries by marrying in 1387 Philippa, daughter of John of Gaunt. During his reign the period of expansion overseas and of geographical enterprise began with the capture of Ceuta on the N. coast of Africa, in 1415, by his son Prince Henry the Navigator (d. 1460). In the 15th and 16th cents. there was a period of discovery which made P. at one time the greatest maritime country in the world. Prince Henry and his captains explored the Atlantic and the W. coast of Africa. They doubled Cape Bojador (1433), and discovered Madeira and the Azores (1442), Senegal (1445), and Cape Verde (1446). The first consignment of slaves was brought to Lisbon in 1434. The Cape of Good Hope was doubled by Bartolomeu Dias in 1486, and Vasco da Gama reached India in 1497. In 1500 King Emanuel (Manoel) assumed the title of 'Lord of the conquest, navigation, and commerce of India, Ethiopia, Arabia, and Persia,' and in the same year, Portuguese settlements were made in Brazil and on the W. coast of India. Gaspar and Miguel Corte-Real reached Greenland in 1500-1, and fresh colonies were made in E. and N. Africa. Albuquerque conquered Goa (1510) and Malacca (1511); the Portuguese dominion in the Malay Archipelago was founded (1512-14), and commercial relations were entered upon with China (1517) and Japan (1542).

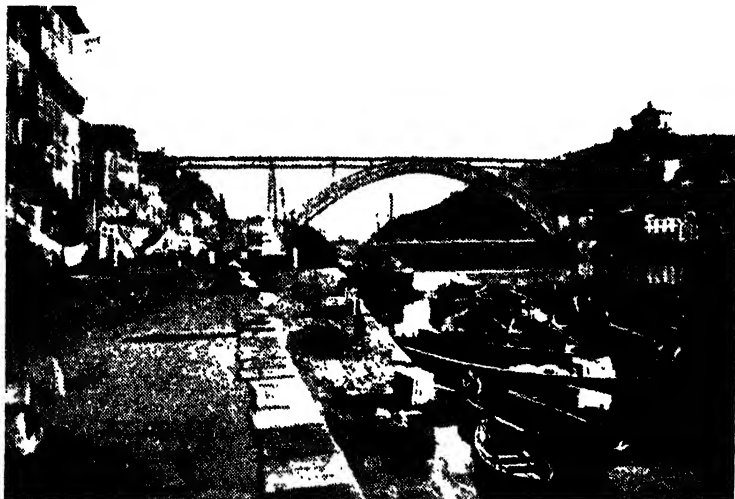
At this time P. was at the height of her power. Her commercial enterprise knew no limits, and Lisbon was recognised as the great centre of oriental traffic. Her subsequent fall was at least partially due to the persecution and later expulsion of the Jews, who contributed greatly to the wealth of the country, and to the introduction of the Inquisition (1536) and of the Jesuits (1540). In 1578 the country suffered an overwhelming disaster in the defeat and death of the young King Sebastian, grandson of John III (1521-57), at Alcazar-al-Kebir. Sebastian was succeeded by his uncle, the senile Cardinal Henry, last of the Aviz dynasty. Among the many claimants to the crown was Philip II of Spain, who in the confusion and disaffection marched boldly into the country and had himself crowned king. From 1580 to 1640 P. remained under the Sp. suzerainty, thus becoming involved in the wars in the Netherlands and Germany. England and Holland seized the Portuguese possessions in S. America and the Malay Archipelago. After sev. insurrections P. regained her independence, and John, Duke of Braganza, a descendant of Emanuel I, was crowned John IV in

1640. England recognised the Braganza dynasty when Charles II married Catherine of Braganza in 1662, who brought in her dowry Bombay and Tangier. This confirmed the friendly relations between the 2 countries, which dated back to a treaty of 1373. The country became involved in a colonial war with Holland, and a more serious conflict with Spain. In the reign of Alfonso VI (1656-83), son of John IV, the Sp. were defeated at Elvas (1659), Ameixial (1663), Ciudad Rodrigo (1664), and Montes Claros (1665), and the war concluded with the treaty of Lisbon (1668). The Anglo-Portuguese alliance was renewed by the Methuen Treaty (1703), and P. became involved in the war of the Sp. Succession. P. had lost all her important colonies except Brazil, and was no longer one of the chief powers in Europe. Pombal, a minister of Joseph (1750-77), did his utmost to restore the kingdom to its former position by strengthening the monarchy and encouraging colonial development. He expelled the Jesuits (1759), organised education, and carried out reforms in the defence of the country. On the accession of the mad Queen Maria I, he was deprived of office (1777), and P. relapsed to its former condition. In 1792 Maria's son, John, was appointed regent. In the European war which broke out at the end of the century Dom John obtained substantial aid from Great Britain against Spain and France, but in 1807 left P. for Rio de Janeiro. His act was followed by the Fr. occupation of P. and the crowning of Joseph Bonaparte at Madrid, resulting in the Peninsular war (q.v.), which continued till 1814. In 1816, on the death of Maria I, John VI succeeded to the throne, but remained in Brazil, appointing Marshal Beresford as his viceroy. The discontent which this caused among his subjects resulted in a revolution (1820) and the estab. of a democratic form of government. John hastened back to Lisbon, and promised to obey the 'constitution of 1822.' Meanwhile Brazil had obtained complete independence, with Dom Pedro I (q.v.) as constitutional emperor. On the death of John VI (1826) Pedro, who was now Pedro IV of P., estab. the basis of the constitution which remained in force until 1910, and then, returning to Brazil, abdicated in favour of his 7-year-old daughter, Maria da Glória, who ruled with her uncle Miguel as regent. The latter headed a reactionary movement, and with the aid of the nobility, military, and clergy, proclaimed himself king in 1828. With the help of Brit. troops, Pedro re-estab. his daughter, reintroducing the constitution of 1826. But the emperor died the same year, and a period of misrule and confusion followed, the government being alternately in the hands of the Septembrists and Carlists. The constitutional party owed much of its victory, in 1834, to Brit. support and protection. Maria's son, Pedro V (1853-61), was succeeded by his brother Luiz I (1861-89).

Towards the end of the 19th cent. P.

realised, a little too late, the value of her African possessions, and was obliged to cede some of her ter. in E. and W. Africa, giving up her claim to Nyasaland after the British 'Ultimatum' of 1890. In the previous year Carlos I ascended the throne and was assassinated with the crown prince in 1908. His second son, Manuel II, was dethroned in Oct. 1910, and the republic was proclaimed on 5 Oct. The Provisional Gov. was under the presidency of Dr Braga, who in Aug. 1911 was succeeded by Dr Manuel de Arriaga, the first president of the constitutional republic. A royalist counter-revolution

he was overthrown. Dr Braga became provisional president, being succeeded in Aug. by Dr Machado. In Nov. Costa returned to power, and his allowing the Allies the benefit of interned shipping caused Germany to declare war, 9 March, 1916. P. had been traditionally allied to England for 5 centuries. P.'s chief theatre of war was E. Africa, while Gen. Tamagnini commanded the Portuguese Expeditionary Force (numbering 40,000 men) in France. A war Cabinet was formed by Dr Almeida, including Costa, who formed his own Cabinet in April 1917, but a Lisbon insurrection in Dec.



Portuguese Travel Agency

Oporto

The Ribeira quay and the Dom Luís I bridge over the Douro.

under Paiva Conceiro (Sept. 1911) was suppressed and also an extremist 'Red' revolution in Jan. 1912. The 'Reds' and the Royalists were not represented in the first Congress; the strongest party were the Democrats, into which Alfonso Costa had transformed the fighting revolutionary force, the Carbonária. After 3 ineffective coalition Cabinets, Costa became in Jan. 1913 a veiled dictator, who, however, respected parl. forms. In Feb. 1914 he was succeeded by Bernardino Machado, whose policy was conciliatory. In the First World War royalist P. sympathised with Germany, and the Itepublicans with the Allies. On 9 Dec., 1914 the pro-Ally Premier, Machado, was succeeded by Azevedo Coutinho. The non-interventionist president, Arriaga, allowed the Germans to engineer a neutralist *coup d'état* (Jan. 1915) which made Gen. Pimenta de Castro a dictator, but in May

drove both Costa and president Machado out of office. Braamcamp became provisional president and Maj. Sidónio Pais, leader of the revolutionaries, Premier. Later (10 May, 1918) Pais was elected president, but was assassinated in Dec. Tamagnini Barbosa formed a ministry with Silva Antunes as provisional president. In Jan. 1919 Conceiro estab. a Royalist Gov. at Oporto, but was suppressed. In Aug. Dr Almeida was elected president. During 1920 there were 9 successive Cabinets and a revolution in Oct. 1921. In 1923 Almeida's presidency terminated and Teixeira Gomes succeeded him. He attempted reconciliation in politics, but financially P.'s bankruptcy threatened also her colonial possessions. On 11 Dec., 1925 Machado was again elected president, but in July 1926 his powers were transferred to Gen. Gomes da Costa, who had engineered a successful

revolution until his arrest by Gen. Carmona, who then became a military dictator. On 25 Mar., 1928 he was elected president. The finance minister, Dr Salazar, stabilised economics, and treaties of commerce were signed with Estonia and Poland and of arbitration with the U.S.A. (1929). A new ministry came in on 20 Jan., 1930, with Gen. Oliveira as premier, but President Carmona continued his mild dictatorship despite protests against it which led to revolt and revolution in Madeira and the is. of the Azores (April 1931).

In 1932 Salazar became Prime Minister. Between Sept. 1944 and Feb. 1947 he also held the post of foreign minister. Carmona was re-elected president in 1935, 1942, and 1949. In 1951, following Carmona's death, Gen. Craveiro Lopes was elected president; but Salazar remains the prime force in P. During the Second World War P. remained neutral, but in 1943, under the treaty of 1373, she granted Britain facilities to set up air and naval bases in the Azores. Britain handed back these bases in June 1946. Salazar's benevolent dictatorship has been apparently popular and responsible in character. The assembly set up under the constitution of 1933 provided a form of safety-valve, but with the excesses of the later monarchy and of the republic still in his mind, Salazar has not been prepared to entrust any substantial measure of power to an elected body, and that of the assembly is very limited. It has been able to criticise candidly, however, and has frequently done so on points of detail. In 1949 P. agreed to participate in the N. Atlantic Treaty. Public opinion seemed to welcome the event not as a significant change, but merely as a logical continuation of a policy pursued for many years. The presidential elections of 1949, during which censorship of the press was considerably relaxed, passed off peacefully, a striking contrast to elections held at the beginning of the 20th cent. The opposition candidate, Gen. de Matos, eventually withdrew his nomination. The opposition, then, as later, gave no sign that they could sustain a peaceful parl. regime, and the opposition presidential candidate, though a respected statesman of liberal traditions, offered little constructive criticism of the gov. and had no programme of his own. In 1950 the opposition, which merges the Republican, Socialist, and Communist parties, rallied under the leadership of Prof. Rui Luís Gomes, who stood as a candidate for the presidency in the election of 1951. But he later withdrew his nomination on the grounds that no legal guarantees were given by the gov. to allow a truly democratic election. In the parl. election of 1953, the gov. party gained all 120 seats, every one of the 25 opposition candidates being defeated. It is difficult to gauge the true extent of opposition to the existing regime: probably it is most prevalent among the intellectuals, but (1957) it would not appear to have any real significance in Portuguese political life.

P. has remained a poor country with a low standard of living. The Salazar Gov. recognises that without greater industrialisation little can be done to raise the general standard of living, and put forward an ambitious scheme of public works and plans to develop power schemes. A series of hydro-electric works connected with dams on the Rts. Cavado and Zezore were begun with the same objects, to be completed in the early 1950s. The electrification of all the railways is under consideration, and a number of new deep-water docks planned for the port of Lisbon. P. is also going to start a heavy industry. The first plans for an important steel plant to be built in Onomcorvo (province of Trás-os-Montes) have reached completion in 1956.

Language and Literature. Portuguese, a branch of the Romance branch of languages, has grown out of Lat. dialects spoken in the prov. of Lusitania at the time of the Rom. occupation, and through the influence of the Saracen invaders an Arabic element was later introduced. Portuguese is strictly connected with Gallego, the dialect of the old kingdom of Galicia. With the growth of national pride in P., the language became more differentiated from the other Romance tongues of the peninsula. Portuguese is spoken by 8,618,000 people in P., by about 45,000,000 in Brazil, by about 11,000,000 in the Portuguese colonies of Africa, about 1,000,000 in Asia, and about 1,500,000 in Oceania, apart from the 'pidgin' Portuguese varieties in Africa, India, and SE. Asia. Gallego is spoken by about 3,000,000 people in NW. Spain. The reign of Alfonso III saw the production of many troubadour songs, the oldest collection being the *Cancioneiro da Ajuda*. The royal patronage of bards was continued by his son, King Dinis (1279-1325), himself the author of numerous trovas and pastorals. The early court poetry is preserved in the *Cancioneiro Geral* (1516), compiled by Garcia de Resende (1470-1536). Throughout the 14th and 15th cents. many prose chronicles, lives of saints, and genealogical registers were written, and the legends of Arthur, Merlin, Amadis of Gaul, and other heroes of chivalry, legends which permeated the literature of W. Europe, early penetrated into P. Portuguese drama went through the natural stages of religious play, morality, farce, and comedy. Its founder was Gil Vicente (q.v.) (c. 1465-1536?), who gathered round him many disciples, including Alfonso Alvarez, António Ribeiro, António Prestes, and Baltasar Dias. António Ferreira (q.v.) (1528-69), author of *Inês de Castro*, was a superb writer of tragedy. The old Provencal traditions of poetry gave place to the classic influence which spread from Italy through Spain. Sá de Miranda (q.v.) (c. 1481-1558), poet and dramatist and founder of the classic schools, was strongly influenced by contemporary It. literature. His *Comédias* (1560-9) became, like his poems, popular in Lisbon. The new classic poetry did not, however, grip the

people at large, and was confined in its popularity to court circles.

But with the growth of maritime and commercial prosperity, new life was fused into the literature of P., and the patriotism of the people found expression in Camoens's *The Lusitans* (1572), a great national epic. The epic form became popular, and Camoens (q.v.) had many imitators, among whom may be mentioned Pereira de Castro (1571-1632), Sousa de Macedo, Sá de Menezes (d. 1664), and Garcia do Mascarenhas. During the years of Sp. rule (1581-1640) the national spirit received an overwhelming blow which necessarily affected the literary output. For a time even Portuguese was abandoned in favour of Spanish. In the 17th cent., however, some good histories were written, notably by António Brandão (d. 1637) and Luis de Menezes (1673-1743). In the early 18th cent. Fr. influence prevailed with most Portuguese poets, but the general standard of taste was raised by 2 poets, F. M. do Nascimento (q.v.) (1734-1819) and Manuel du Bocage (1756-1805), who endeavoured to purify and enrich the language and to preserve the early national traditions. The early 19th cent. witnessed a spirit of revolt against outworn forms and a general revival of letters. The chief exponents of the Romantic movement in P. were Almeida Garrett (d. 1854), J. A. de Macedo (d. 1831), N. T. da Almeida (d. 1811), and Alexandre Herculano (1879). Of the 19th-cent. and modern poets the most notable are Soares dos Passos, Antero de Quental (1842-91), Cesário Verde (1855-86), and Gomes Leal (1848-1921). Among the historians are Herculano (q.v.) (1810-79), Varnhagen, P. da Silva, Luz Soriano, and Oliveira Martins. The novelists of the 19th cent. are represented by Júlio Dinis (1839-71) and Eça de Queiroz (q.v.) (d. 1900), and of the 20th cent. by Manuel Ribeiro and Raul Brandão. The political conflicts of the first 3 decades of the 20th cent. caused some decline in Portuguese literary standards, the poets Eugénio de Castro (1869-1944) and Teixeira de Pascoais (1877-1952) being exceptions to this. But after the First World War a modern school of literary artists grew up, combining some features of Fr. and Amer. literature with a basis of intense nationalism and retaining an essentially deep preoccupation with things spiritual. This school includes Camilo Pessanha, Fernando Pessoa (q.v.), a highly intellectual poet, Sá-Carneiro (q.v.), and the second modern group, José Régio (q.v.), Miguel Torga (q.v.), Almada Negreiros, and Gaspar Simões. After the Second World War a new and vigorous school of novelists emerged, including Ferreira de Castro (q.v.), Alves Redol (q.v.), Carlos de Oliveira, Fernando Namora, and Bessa Luis.

Art. There are some Rom. remains in P., notably at Évora, where there are impressive ruins of a temple to Diana. Great Romanesque cathedrals were built at Lisbon, Coimbra, and Oporto. A notable Romano-Gothic building is the

cathedral at Évora (1185-1204), though the development of Gothic (best represented by the monasteries of Alcobaça and Batalha) was limited. The reign of Manuel I (1495-1521) saw the rise of the individual Portuguese style in architecture known as Manueline, characterised by simplicity of proportion yet also by exuberant decoration. Sculpture in the Gothic period was much inspired by the 'Coimbra School,' an outstanding master being Pero (14th cent.); João de Castilho (1515-52) was a master craftsman in the Manueline style. An important phase of Portuguese art followed the maritime expansion of the 15th and 16th cents., while trade with Flanders brought Flem. influence into painting. A distinguished Portuguese master was Nuno Gonçalves (q.v.) (active 1450-67), whose prin. painting, 'The Veneration of St Vincent,' is at Lisbon. Trade with the E. stimulated the decorative arts, the influence of Chinese, Persian, and Indian design appearing in faience, azulejos (glazed tiles), furniture, and textiles. P. was indeed the earliest European country to understand and interpret Oriental art. In the 17th cent. a richly ornamented baroque style of decoration is to be found. Outstanding both as painter and designer was Domingos António de Sequeira (q.v.) (1768-1837), who designed the gold and silver plate presented by P. to the Duke of Wellington. In the 20th cent. official gov. encouragement has been given to native artists and architects, and many of the characteristics of the Manueline style have been incorporated into modern buildings. See *Arte Portuguesa*, 1955.

Music. P. is noted for its folk music, though it was not until the 19th cent. that musicians began to incorporate folk-themes into their work. This folk-music shows Moorish and troubadour influences. Portuguese music otherwise tended to be modelled on Sp. forms. Among composers inspired by their native music may be mentioned Luiz Freitas Branco, Viana da Mota, Ruy Coelho, and Fernando Lopes Graça.

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Portuguesa, state of W. central Venezuela, N. of Zamora, named after the riv. P. It is an agric. state, sugar, coffee, maize, and cocoa being the chief products. Guanare is the cap. Area 5870 sq. m. Pop. 122,153.

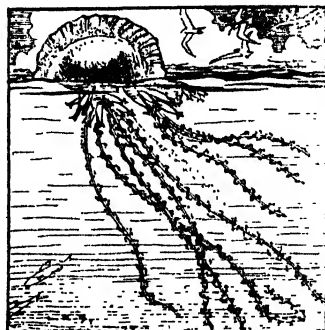
Portuguese East Africa, see MOZAMBIQUE.

Portuguese Guinea, colony of Portugal on the coast of Senegambia, W. Africa; it includes the Bijagoz archipelago in the Atlantic. P. G. has an area of 14,300 sq. m.; Bissau is the chief port and cap. The prin. exports are palm oil, rice, and hides. Pop. (1950) 510,779.

Portuguese India, 3 dependencies: Goa (q.v.) on the Malabar coast; Damão, on the coast 100 m. N. of Bombay; and Diu (q.v.), a small is. about 130 m. W. of Damão. Goa, or Panjim, is the cap. There are manganese deposits near Mormugão. There is a strong Indian demand for these terts. to be ceded to Indian control.

Portuguese Man-of-War, name given to the species of *Physalia*, a genus of the Siphonophora, remarkable on account of their brilliant blue colours, size, and the severity of the pain its members are capable of inflicting on the human skin. The feeding, stinging, and reproductive members of the colony trail in the sea beneath a gas-filled float bearing a sail-like crest. This catches the wind, and thus the animals are distributed over the sea. They inhabit the warmer parts of the ocean, but may occasionally be brought to temperate regions, as during late Aug. and early Sept. 1957, when numbers appeared in the Engr. Channel. In Jersey sev. people were treated for stings. See also JELLY-FISH.

Portuguese West Africa, see ANGOLA.
Portumna, tn of co. Galway, Rep. of Ireland, overlooking R. Shannon and Lough Derg (q.v.). Pop. 900.
Portus Augusti, see OSTIA.
Portus Gadetanus, see PUERTO REAL.
Portus Lunae, see SPEZIA, LA.
Portus Ostensis, see OSTIA.
Portus Trajani, see OSTIA.



PORTUGUESE MAN-OF-WAR

Porvoo, (Borgå), tn and seaport in the prov. of Uusimaa, Finland, situated on the R. Borgo where it enters the Gulf of Finland. It is about 34 m. NE. by rail from Helsinki. Trade is impeded by the shallowness of the bay. Leather and furs are the chief articles of commerce, and there are also manufs. of sail-cloth and tobacco. Here, in 1802, the Chamber of Deputies drew up the Constitution of Finland. In 1809 it was the seat of the Finnish Diet. Though the importance of Porvoo as a commercial tn has diminished recently, it is one of the most picturesque tourist centres, and famous also as the bp. of J. L. Runeberg (q.v.), Finland's national poet. Pop. 10,300.

Posada, José Guadalupe (1852-1913), Mexican, b. Aguascalientes, one of the world's greatest engravers and caricaturists since Goya and Callot.

Posadas, tn of Argentina, cap. of Misiones prov., on the Alto Paraná R., 700 m. NE. of Buenos Aires. Yerba maté, tobacco, timber, and flour are produced in the vicinity, and stock-raising is carried on. Near by are the ruins of the old Jesuit missions, from which Misiones derived its name. Pop. 37,000.

Poseidon, Gk god of the sea, son of Cronus and Rhea, identified with the Rom. Neptune, married to Amphitrite. He controlled the sea, the winds, and earthquakes, his symbol being a trident. His palace was at the bottom of the sea, near Aegae in Euboea, where he kept his chariot and his stud of horses. He built the walls of Troy, but, not being rewarded for his work, showed implacable hatred for the

Trojans. He competed with Athens for Attica, and conspired against the sovereignty of Zeus.

Poseidonius (c. 135-c. 51 BC), Stoic philosopher, b. Apamea in Syria. He was a pupil of Panaetius. He travelled considerably, visiting Rome in 86 BC, and was the teacher and friend of Cicero. See K. Reinhardt, *Poseidonius*, 1921.

Posen, see POZNAN.

Positive Rays were first discovered in 1886 by Goldstein during experiments with discharge tubes containing rarefied gases. He noticed that luminous streaks passed through holes in the cathode in the tube, and he named these streaks *Kanalstrahlen*. J. J. Thomson revealed the nature of these streaks, and finding them to consist of positively charged particles, he renamed them P. R. Thomson used a discharge tube with a perforated cathode, and the rays were made to pass through an electric field and a magnetic field successively. The fact that the rays were deflected in these fields proved that they consisted of charged particles; the direction of the deflection proved that the charges were positive, and measurements of the deflections produced by the electric and magnetic fields enabled Thomson to compute the ratio of the charge to the mass of the particle. He thus established the fact that the particles were ionised atoms, i.e. atoms minus one or more electrons, and as the electronic charge was known he was able to determine the mass of the atom in question. Subsequent experiments with an improved form of Thomson tube by Aston led to the important discovery that most chemical elements really consisted of a mixture of simpler elements. The simpler elements had identical chemical properties, and were named isotopes (q.v.), but their atomic weights were different. Chlorine, for example, consists of 2 isotopes having atomic weights 35 and 37 respectively. Any sample of chlorine contains these isotopes in proportions that never vary, and the atomic weight of chlorine determined by chemical means is found to be 35.5. Aston's result has explained many anomalies in the periodic classification of the elements, and it has confirmed the hypothesis that all atoms, electrons, protons, and neutrons (qq.v.) are built up of the same bricks. See also ISOTOPES; ATOM.

Positivism, philosophical system which restricts itself to the data of experience, rejecting all *a priori* and metaphysical speculation. In the 17th cent. Hume confined himself to the sphere of observation. He considered causal relations as merely what experience has led man to expect. While not denying absolute reality, he declared it outside the scope of his perfect system. The true founder of P., however, was Auguste Comte (q.v.), who owed much to Saint-Simon. P. starts from the assumption that knowledge is based solely on the methods and discoveries of physical science, and attempts the revaluation of social and moral values in the light of the exact sciences. Comte

adopted a 'religion of humanity' akin to Nietzsche's idea of Superman, and proposed to dethrone the gods of existing religious beliefs and raise the welfare of mankind as the object of worship. There exists a positivist church with ritual and organisation which has been aptly described by Huxley as Catholicism without Christianity. See A. Comte, *General View of Positivism* (trans.), 1908; G. Deherme, *A. Comte et son œuvre, le positivisme*, 1909; and H. Gouhier, *Jeunesse d'A. Comte et la formation du positivisme*, 1933-6.

Positivism, Logical, school of philosophy arising out of the work of Auguste Comte. Its fundamental propositions, briefly stated, are 3 in number. Firstly, the meaning of any statement about the everyday world is the method by which its truth is verified through sensations; thus 'this is a picture' means that sensations of colour, hardness, coldness, etc., are being produced. Secondly, and following from the first, there is no meaning in theological or metaphysical statements, because these are *not* made about the world which is experienced by the senses. There can be no meaning in statements about the nature of God, because His existence cannot be verified by sense experience. Thirdly, and again following from the first, propositions concerning aesthetics or ethics e.g. that 'stealing is wrong' or that 'Keats's poetry is beautiful,' contain only the expression of a subjective emotion and do not say anything about the objects they purport to discuss, since 'poetry,' 'beauty,' 'evil,' etc., are not experienced by the senses. Though a movement of great influence, the doctrine has a profoundly destructive effect, since, if its propositions be granted, no theory about the nature of the universe can be offered. See A. J. Ayer, *Language, Truth, and Logic*, 1936, 1946, and C. E. M. Joad, *A Critique of Logical Positivism*, 1950.

Positron or Positive Electron, an elementary particle having the same mass as the electron (q.v.) and an electric charge of the same magnitude but opposite in sign. Its existence was predicted by Dirac in 1930, and first observed by Anderson in 1932 in a Wilson cloud chamber (q.v.), as the result of a cosmic-ray interaction. In 1933 Blackett and Occhialini showed that an electron and a P. were usually produced together, and in the same year it was established that the electron pair was formed from high-energy gamma-rays (q.v.). A P. is annihilated after an average life of about 10^{-10} sec. by combination with an electron. All the mass of the 2 particles appears as the energy of 2 gamma-ray photons, if the electron is free, but for electrons bound to an atom only 1 gamma-ray need be emitted. Certain artificially produced radioactive isotopes emit positrons in a manner closely analogous to the emission of beta-particles (q.v.).

Posology (Gk *posos*, how much; *logos*, science), science of quantity. The term was used by Jeremy Bentham in his system of classification of sciences. The

science of the body, somatology, was divided by him into P., the science of quantity (i.e. mathematics), and poiology, the science of quality. The modern use of the term P. is now confined to medicine, particularly homeopathy, where it means theory of dose. In the decimal system, the pure substance or pure tincture is denoted by 1. To make the first decimal dilution 10 grains of the substance are mixed with 90 grains of sugar of milk, or 10 drops of the mother tincture with 90 drops of alcohol. The second decimal dilution, or 2X potency, is made by mixing 10 parts of the first dilution with 90 parts of sugar of milk or alcohol, and so on. A centesimal system is also worked, the ratio of successive potencies being $\frac{1}{100}$.

Both systems of P. are associated with various branches of homeopathy.

Posse Comitatus (power of the co.). 'Raising the P. C.' is an ancient common-law power inherent in any justice of the peace or sheriff to take of the co. any number of persons he deems necessary to accompany him in the pursuit, arrest, and imprisonment of traitors, felons, and breakers of the peace. According to Blackstone everyone over 15 years of age and under the grade of a peer is bound under pain of fine and imprisonment to obey the order. The power is never exercised at the present day.

Possession. It is safe to say that the whole field of legal theory contains no conception that has given rise to such difficulties as that of P. These difficulties are not merely academic, for the legal consequences of the acquisition and loss of P. are of great practical importance. Corporeal P., i.e. the P. of a material object, is defined by Salmond as the continuing exercise of a claim to the exclusive use of it. The subjective element consists in the intention (*animus possidendi*) to appropriate to oneself the exclusive use of the thing; the physical or objective, in the external facts which effectively realise or embody the intention. This realisation is derived as a rule from one or more of the following sources: (1) the physical power of the possessor; (2) the personal presence of the possessor; (3) secrecy; (4) custom; (5) respect for rightful claim; and (6) the manifestation, by entry, apprehension, and actual use, of the *animus domini* (intention to own). Incorporeal P., if it can be said to amount to P. at all, is the P. of any non-material object, e.g. a right to light or any other easement (q.v.) (see also INCORPOREAL HEREDITAMENT; PRESCRIPTION). Physically, as no mere claim to exclusive user can be effective, it is essential in the case of incorporeal P. that the possessor exercise his P. by *continuous* use and enjoyment. On the whole, the authorities concur in calling corporeal P. the P. of a *thing*, incorporeal the P. of a *right*. In both civil and criminal law it is often of vital importance to distinguish P. from ownership, e.g. to differentiate larceny (q.v.) from false pretences (q.v.). Ihering's statement of the relation between P.

and ownership may be adopted, viz. 'Possession is the objective realisation of ownership,' i.e. P. is in *fact* what ownership (Rom. *dominium*) is in *right*, or, in other words, 'Possession is the *de facto* exercise of a claim: ownership is the *de jure* recognition of one' (Salmond). A number of important consequences flow from P.; e.g. it is evidence of ownership, and the possessor can put all other claimants to proof of their alleged titles (i.e. it is the proverbial nine points of the law); long P. in certain circumstances gives a complete title even as against the true owner (see PRESCRIPTION; LIMITATIONS, STATUTES OF); ownership may be transferred by mere transfer of P., e.g. in the case of certain negotiable instruments; a possessor having no title may often confer a good title on another, e.g. if a thief pays another man for goods with stolen coin. It may be noted that a widely accepted theory of P. is that of the celebrated jurist Savigny, to the effect that the essence of corporeal P. is the physical power of exclusion; but that, while at the commencement of P. present or actual physical power of using a thing oneself is requisite, mere ability to reproduce such power at will is sufficient for the retention of P. once acquired. Salmond asks 'What physical power of preventing trespass does a man acquire by making an entry upon an estate which may be some square miles in extent?' It is clear that in a civilised community physical force is only an alternative element in P., and that by no means the most important. The whole theory, indeed, has been attacked by Savigny's equally celebrated opponent, Ihering, in *Grund des Besitzes*. A great deal of gratuitous difficulty arises from confusing the physical power of the individual and the active or dormant physical force of the State, the one element being important in some cases, while in others, e.g. P. of land, the force of the State is the real guarantee of occupancy.

Possession, Demoniac, see DEMON-OLGY.

Posset, hot drink of curdled milk, etc., formerly taken at bed-time, to cure a cold or cough. The milk was boiled, and to it was added wine or ale of the old type (i.e. not bittered with hops), sugar, or treacle. The mixture was then reheated.

Post, Emily (1873-). Amer. journalist, b. Baltimore, her maiden name being Price. Becoming a columnist, she wrote on social manners, and is famous for her book, *Etiquette in Society, in Business, in Politics, and at Home*, 1922, which was accepted as a standard authority in America.

Post-Impressionism, the phase of painting which followed Impressionism (q.v.), and is marked by reaction against fugitive, atmospheric effect and a desire for firmer pictorial construction. Other points in Post-Impressionist technique are a perception of formal relations revealed in painting and the ability of the painter, if necessary, to dispense with representational details and to break away from the

camera vision. Among the main representatives of P. are Seurat, Cézanne, Gauguin, and Van Gogh (qq.v.).

P. as a whole is not naturalistic painting, though it is scarcely to be regarded as an organised movement but rather as a mood at the turn of the cent. which links artists in other ways individual and divergent; and is much less specific than, e.g., Cubism. P. did not reach England until 1910, when the first exhibition of works by modern French painters was held in London. P. in England was most strikingly represented by the Camden Town Group, formed in 1911, including Spencer Gore, Harold Gilman (qq.v.), and others.

Post Mills, see WINDMILLS.

Post-mortem Examination. When a coroner issues a summons to a medical practitioner to attend and give evidence as to how a deceased person met his death, he may, either in the summons or at any time down to the end of the inquest, direct the practitioner to make a P. E. of the body of the deceased either with or without an analysis of the contents of the stomach or intestines. Frequently the practitioner who attended the deceased at his death is called upon to make the examination, but if evidence is given at the inquest to the effect that the death was the result of improper or negligent treatment by a practitioner, that practitioner may not be permitted to perform or assist in the P. E. By the Coroners Act, 1887, a coroner's jury, if not satisfied by the evidence brought before it, may require the coroner to summon some other medical practitioner named by it, and to direct the practitioner so summoned to make a P. E., whether an examination has been previously made or not. A P. E. is necessary only where it appears either to the coroner or the jury that it will explain the cause of death. *See* CORONER.

Post-nuptial Settlement, see SETTLEMENT.

Post-obit Bond, bond given to secure the repayment of a loan on the death of some specified person from whom the borrower has expectations.

Post Office. It is often said that in England prior to the 17th cent. nothing is heard of a P. O., and in the modern sense of that term as denoting a govt. dept. possessing a monopoly as to carriage of letters, the statement is true. But correspondence between subjects, as distinct from communications between states, must have existed from the earliest times, and the only difficulty, if any, is to determine the precise mode of transmission before the state couriers both in England and in other countries were permitted to carry such correspondence along with public dispatches. The Close and Mesae Rolls, the wardrobe accounts of the kings of England, royal proclamations, and other records afford ample evidence of a regular if rudimentary postal system for royal correspondence. The expenses of the estab. of *nunci* entrusted with the conveyance of letters formed a large item in the charges of the royal household as

early as the middle of the 13th cent., and these payments, which will be found enrolled on the Close and Mesae Rolls, may be traced in an almost unbroken series through the records of reigns subsequent to that of King John. The method of transmission was by relays of men and horses maintained under the superintendence of some govt. official. Herodotus describes a similar means of communication in vogue with the anc. Persians, and it can hardly be doubted that the Rom. practice of transmission by *tabellarii* (from the *tabellae*, or waxen tablets, on which the *epistolae* were inscribed), as described by Festus and by St Jerome, was closely analogous. Whatever the precise manner of evolution, however, it is clear that by 1548 the transmission of the private correspondence of the subject by post-horses had become a common practice, for a statute of that year fixed a penny a m. as the rate of hire. Camden mentions Thomas Randolph as the chief postmaster of England in 1581, but this office would seem to have existed at least as early as the reign of Henry VIII. What the duties were is not clear, as the earliest recitals of the duties and privileges appertaining to the office occur in the reign of James I, which monarch, according to the letters patent of Charles I, constituted an office called the office of postmaster of England 'for foreign parts being out of his dominions.' James I, however, went further than this, for, according to Kennedy's *Annals of Aberdeen*, he introduced improvements in the postal system upon the lines suggested by the methods in vogue in various Scottish tns. From all accounts it seems that we owe the amelioration of the service as it existed in the early part of the 17th cent. to the necessity for a better means of communication between England and Scotland, a conjecture borne out by sev. proclamations, especially one of 1635, which was made 'for settling of the letter-office of England and Scotland.' That proclamation recites 'that there hath been no certain or constant intercourse between the kingdoms of England and Scotland,' and commands 'Thomas Witherings, Esq., his Majesty's postmaster of England for foreign parts, to settle a running post or two, to run night and day between Edinburgh and Scotland and the City of London, to go thither and come back in six days'; and directions are given for the management of the correspondence between post-tns on the line of the road and other named tns, and similarly in Ireland.

In 1649 the Common Council of London endeavoured to inaugurate a separate P. O., but was thwarted by a resolution of the Commons, which declared the office of postmaster to be in the sole power and disposal of Parliament. Throughout the earlier part of the Stuart period constant attempts were made by private individuals to break the royal monopoly, but they were one and all unsuccessful. The only class of persons, indeed, that ever seems to have been favoured with the right to send

its own letters by its own service was the mercantile community, but except as to the Company of Merchant Adventurers the privilege was speedily revoked. During the Commonwealth the postal service was farmed out by the Commons at a rent of £10,000 a year to one John Manley (later, for £21,500 annually, to Henry Bishopp). The latter half of the 17th cent. saw considerable advances in the estab. of a P. O., advances which were probably hastened by the public-spirited agitation for reform by John Hill, a Yorkshire attorney who, considering the

Irish, or foreign, and for post-horses, were fixed. All other persons whatsoever were forbidden to 'set up or employ any foot-posts, horse-posts, or packet boats.' In 1680 a metropolitan penny post was instituted by the celebrated Wm Dockwra, who carried and insured letters and parcels up to £10 in value and a pound in weight for one penny. He naturally excited the fury of the farmers by his enterprise and involved himself in litigation, the ultimate consequence of which was that his penny post became a part of the General Post Office (G.P.O.), and he



Postmaster-General

THE ROYAL MAIL COACH, LONDON TO GLASGOW, 1840

Engraving by T. W. Hoppam after a painting by J. F. Herring, Senior.

gov. monopoly to farmers to be an infringement on the liberty of the subject, organised a postal service at half the gov. farmers' rates, and nearly lost his life for his audacity. The gov. intended at all costs to keep the monopoly because it was a source of revenue, and because it enabled them by a system of espionage to control the political agitator at home and abroad. The gov. still possesses limited powers of espionage, but its unfettered liberty in that respect was curtailed as a result of the indignation roused by the opening of the letters of the celebrated refugee Mazzini.

In 1657 an Act was passed to establish one general P. O., and one officer, to be styled the postmaster-general of England and comptroller of the P. O. This officer was to have the horsing of all 'through' posts and persons 'riding in posts.' Prices for letters, whether Eng., Scottish,

himself, as a solatium, was appointed comptroller of the London office. The prin. reforms from that time down to the measures of Sir Rowland Hill were the invention by Allen of the cross-roads postal system; Palmer's mail-coaches, these latter being accompanied by armed escorts and so constructed as to nullify as far as possible the attentions of the omnipresent highwayman; and the development of the packet system, especially through the advances made in steam navigation.

Rowland Hill, arguing from the unprogressive rate of revenue from the postal service, and the fact that the charge of postage altogether exceeded the actual cost of receipt, delivery, and transit, advocated, in his pamphlet *Post Office Reform*, the estab. of a uniform penny postage throughout the kingdom, as the

only alternative to the impossibility of collecting what he estimated to be the average cost of postage of a single letter, namely, something less than one-tenth of a penny. His proposals met with ridicule from more or less interested quarters, but public agitation called for the appointment of a select committee of inquiry into the whole economic aspect of P. O. charges. The result was the Act of 1839, which enabled the Treasury to establish a uniform penny rate for the whole of the U. K., the scale of weight being 1d. per half-ounce, or 2d. per ounce, all fractions of an ounce above the first being reckoned as an ounce. Postage stamps (q.v.) were introduced in place of the old method of payment in advance, shortly afterwards. The success of Hill's scheme, in the teeth of prejudice both inside the P. O. and in gov. circles, is sufficiently proved by the fact that the number of letters delivered in the U.K. rose from 1,585,973 for the week ending 24 Nov., 1839, immediately prior to the scheme being put into execution, to 6,849,196 for the week ending 21 Feb., 1849, and the yearly net revenue in the space of 20 years reached the figure it stood at in 1838, namely £1,652,424. In 1956 it stood at £113 million approx. This rise in net revenue was certainly not striking for the first 30 years, but it is to be remembered that the old charges were in the highest degree exorbitant (9d. a letter being an average charge for transmission outside London), and further, that the profits of the P. O. were burdened with the payment of certain large pensions. Since Hill's time the most notable features of the hist. of the P. O. have been the estab. of the parcel post (aimed at the excessive charges of railway companies), the institution of the P. O. savings bank, the transfer to the State of the telegraph and telephone services, the introduction of post cards and letter cards, the extension of overseas and air-mail facilities, and the estab. of a number of special postal services. These latter include the registration of letters and parcels, the Cash on Delivery and Express Delivery services, the conveyance of letters by Brit. Railways, the introduction of a Poste Restante arrangement for the convenience of travellers, and facilities for the transmission of money through the post by means of money and postal orders. The rates and charges for all these services, together with those for telegrams and telephones, are subject to periodic revision, and may be ascertained from any P. O. The gradual rise in cost of postal services can be judged by the progress of the original penny post; during the First World War this rate was raised to 1½d., and this in turn to 2½d. during the Second World War, both these increases being initially temporary measures to provide additional revenue in war-time, but then becoming permanent; and in 1957 a minimum charge of 3d. was introduced, with relative increases in other rates, to meet rising P. O. costs. National Savings Certificates and Premium Bonds

(qq.v.) may be purchased at most P. Os.; for details of the P. O. Savings Bank see SAVINGS BANKS.

STAFF AND ORGANISATION. The ministerial head of the P. O. is the postmaster-general, who is responsible to Parliament for the conduct of the affairs of his dept; his chief adviser is the director-general, who is the permanent head of the dept. The headquarters of the P. O. are in the city of London on a site long associated with P. O. work. Under the director-general the work of the administration is divided into 5 main groups of depts: (1) the personnel and establishments dept., which deal with matters affecting staff; (2) the postal services dept., where policy relating to home and overseas mail services is decided; (3) the telecommunications (inland and external) and radio depts, for the settlement of matters relating to telephone, telegraph, and wireless; (4) the mechanisation and buildings dept., which deals with the development of mechanisation projects, and policy affecting all P. O. buildings; (5) the public relations dept., acting as liaison between the P. O. and the general public. These depts are staffed mainly by what are known as the Treasury classes (the general civil service clerical, executive, and administrative grades), but there are in addition many specialist P. O. grades. With their separate H.Q. in London are the main depts, which control the working of the services within their respective spheres. These are the accountant-general's dept, the engineering dept, the P. O. savings dept, and the supplies, contracts, factories, and solicitor's depts. To organise control effectively throughout the country and to provide local contact with P. O. administration, the country is divided into 3 directorates (Scotland, Wales and Border Counties, and N. Ireland) and 7 regions. Within a directorate or region all P. O. services are gathered under the control of the director or regional director, except that in London the postal and telecommunications sides are separated into 2 functional regions. Within the directorate or regional organisation the 2 main sides of the work are split up into smaller geographical units.

TELEGRAPHS AND TELEPHONES. The inland telegram service extends over Great Britain, N. Ireland, the Channel Is., and the Is. of Man, and between these places and the Rep. of Ireland. The whole of the trunk and local telephone service throughout the U.K. is operated by the P. O. (except in Kingston upon Hull, where the local telephone service is controlled by the city corporation). Historical and technical details of these 2 services are given under TELEGRAPHY AND TELEPHONY.

The first public overseas telephone service was opened in 1891 between London and Paris. To-day the service is extended to most countries of the world and to ships at sea, over 4,000,000 calls being exchanged with overseas countries in 1955-6. Communication to the continent

of Europe is principally by cable, and in 1956 the laying of the first transatlantic telephone cable was completed. This had been made possible by the development of submerged valve amplifiers which should work without attention for between 10 and 20 years. It ensures a 24-hr service between this country and Canada and the U.S.A.

London is a major switching centre, and calls between many overseas countries pass through the P. O. Continental and International Exchanges. A network of radio stations throughout the country is used for the telephone service to the more distant countries, and of these Rugby is the most important, and is one of the largest and most up to date in the world.

Telex Service provides one of the fastest methods of sending written messages over long distances. A network of telex exchanges provides a 24-hr service giving subscribers full intercommunication, on demand, with all subscribers in the U.K., to most countries in Europe, and to other places overseas, including the U.S.A. and S. Africa. The service can also be used for sending and receiving inland and overseas telegrams. Messages are typed on teleprinters which produce page copies at both the sending and receiving office even when the receiving office is closed, since the teleprinter will automatically switch on, record a message, and switch off at the end of the call. The standard rental is £160 per annum, and call charges between centres over 25 m. apart in the U.K. are approximately a half, and to European countries approximately two-thirds of the equivalent telephone charges.

THE POST OFFICE AND THE CRIMINAL LAW. The law as to larceny or other offences in relation to the P. O. is to be found for the most part in the Post Office Act, 1953. A P. O. official who steals or destroys a postal packet is liable to imprisonment for 7 years, or if the postal packet contains any chattel, money, or valuable security, to imprisonment for life. Larceny of a postal packet, or of any chattel, money, or valuable security out of a postal packet in course of transmission by post, is punishable with imprisonment for life. Fraudulent retention, or wilful secretion by any person of postal packets found or delivered by mistake, is also heavily punished, whilst the opening of other people's postal packets is punishable by a fine of £50 or 6 months' imprisonment. P. O. officials who wilfully or negligently omit or delay to deliver or improperly divulge the purport of any telegraph message are liable to a heavy fine. Disclosure or interception by P. O. officials of any message entrusted to them may involve 12 months' imprisonment. Obstruction or molestation by any person of an officer of the P. O. in the execution of his duty is punishable with a fine of £10 or 1 month's imprisonment or both such fine and imprisonment. The transmission by telephone of any grossly offensive or indecent message may entail a fine of £10 or imprisonment for 1 month or both such fine and imprisonment. A person

who sends a message by telephone which he knows to be false for the purpose of causing annoyance, inconvenience, or needless anxiety to any other person, or who persistently makes telephone calls without reasonable cause for any of the purposes above mentioned, is also liable to a fine of £10 or 1 month's imprisonment or both. It is illegal to send through the post any packet consisting of any indecent or obscene matter, or (except with the permission of the Postmaster General) any explosive or dangerous substance, any sharp instrument not properly protected, any deleterious or noxious substance, any article which may be a source of damage to other postal packets, or any living creature. Prohibited articles, if detected, are liable to detention and the sender to prosecution.

FOREIGN POSTAL SYSTEMS: *The United States.* The hist. of the Amer. P. O. shows a parallel deficiency of revenue to that of England on the occasion of the reforms of 1884 on the introduction of the two cents (1d.) universal postage. The feature of the Amer. postal system for 70 years had been the development of the railway mail service, which by reason of the vast extent of the country and the great mileage of railroads rapidly reached a pitch of excellence which has never been excelled. But after the First World War the U.S. postal service began the development of air-mail services. At first the P. O. Dept ran its own planes. Soon the work was done by contract with aeroplane companies, which developed into the greatest air service in the world, linking up all the great cities in the U.S.A. The fee in 1957 was 6 cents an ounce or fraction thereof up to 8 oz. In the U.S.A. all mail matter is divided into 4 classes. *First-class matter* includes letters, postal cards, post cards, and anything sealed against inspection: 1957 rate, 3 cents an ounce for each ounce or fraction of an ounce. *Second-class matter* includes all printed newspapers and periodicals, entered as second-class matter and sent by the publisher: it is sent at special low rates, which vary with the amount of advertising and the purpose of the matter. *Third-class matter* includes pamphlets, printed books, engravings, circulars, not exceeding 8 oz.: rate, 2 cents for the first 2 oz., 1 cent each additional ounce, with cheaper rates for books. *Fourth-class matter:* under the Parcel Post Act, 1912, all matter not included in the first three classes and not exceeding 11 lb. in weight, nor 72 in. in length and girth combined. The limits have been extended and, under certain conditions, are now 70 lb. and 100 in. The 1957 rates for parcel post are shown in the table on page 175.

Franking, which was greatly abused, was abolished in 1873, but was largely restored a few years later. The P. O. carries official matter under penalty labels or envelopes (that is, containing a notice of the penalty incurred by improper use). This privilege is extended to congressmen and gov. officials. Before 1862 carriers were remunerated by collecting 1-2 cents

for delivery. The free delivery was first authorised by law in 1863, and in 1901 866 cities and towns were included in this scheme; since 1896 it has included rural posts, also. Immediate delivery by special messenger was instituted in 1885. In 1864 the money-order system was established. There is a registry system in force, increasing according to the value of the packet registered. There is a postal savings system in which deposits by individuals from \$1 upwards are accepted; no one can have more than \$2500 to his credit. In 1955, \$2,007,996,000 were thus on deposit. Savings certificates are issued. The stamp system for amounts less than \$1 is in force; interest is at 2 per cent. In 1955 there were in the U.S.A. 38,315 P.O.s; the total revenue in 1955 was \$2,349,477,000, and the expenditure \$2,712,150,000.

U.S.A. FOURTH CLASS (PARCEL POST) MAIL

Zone, miles	First lb.	Additional lb., through 70 lb.
	cents	cents
Local	18	1-45
1-2 to 150	23	3-95
3 150-300	23	5-15
4 300-600	24	6-9
5 600-1000	26	9-25
6 1000-1400	28	11-95
7 1400-1800	30	15-2
8 over 1800	32	18-05

France. To France belongs the honour of having originated, through the celebrated Pierre d'Alméras, not only the system of transmission of money by post, but the registration of letters. As in England, so in France, the P. O. revenue and administration during the 17th cent. were farmed out, and similarly that system led to intolerable abuse and corruption. In regard to the inauguration of a system of insuring articles of declared value, the issue of postal notes payable to bearer, and the introduction of postage stamps, France generally lagged from 10 to 20 years behind England.

Germany. The outstanding name in the hist. of the Prussian P. O. is that of Dr von Stephan, who was also the dominating figure in the organisation of the International Postal Union of Bern. As in England, the Prussian system grew out of a purely gov. service, stimulated by the private letter and parcel post of a commercial guild.

Switzerland. Mail services, after being controlled by various cities and cantons, became state-owned and uniform in 1848. From 1865 until 1880, however, private hotel stamps having legitimate postal value were issued for the delivery of guests' mail from hotels to the nearest P.O.s. Telegraph and telephone services were attached to the federal administration after the First World War. The postal motor-coach service, now covering nearly 4000 miles of mainly Alpine roads,

is also run by the Federal Post Office, and has rapidly developed in recent years. See also SWITZERLAND, *Communications*.

UNIVERSAL POSTAL UNION. The impetus given to international correspondence by the Industrial Revolution demanded a simplification of rates, weights, etc. On the initiative of Montgomery Blair, postmaster-general of the U.S.A., a conference was held in Paris in 1863 at which certain broad principles were agreed upon. The idea of reform was then taken up by Dr von Stephan, head of the Prussian postal service. His draft treaty establishing a General Postal Union was laid before the first congress, at Bern in 1874, and was put into force, as the 'convention' in 1875. Under it, for postal purposes, international frontiers are regarded as non-existent, and there is an unrestricted right to use the services of any other country, with an obligation to pay for mail sent in transit via another country. The Convention prescribes international postage rates and rules for the make-up of mail, deals with the mutual settlement of accounts, and, with sev. subsidiary Agreements, embraces all aspects of the international postal service. Congresses are held at 5 yearly intervals to revise the Convention and Agreements, the Congress being the legislative body of the Union. The latter is now one of the specialised agencies of the United Nations. All countries, except a few unimportant ones, are now party to the Convention.

See J. W. Hyde, *The Royal Mail*, 1880; J. C. Hemmeon, *History of the British Post Office*, 1912; L. Kalmus, *Weltgeschichte der Post*, 1937; E. R. Davis, *International Postal Service*, 1938; G. Walker, *Haste, Post, Hastel*, 1938; G. A. Campbell, *His Majesty's Mails at Home and Overseas*, 1939; J. J. Floherty, *Make Way for the Mail* (U.S.A.), 1939; and H. Robinson, *Britain's Post Office, A History*, 1953.

Post-office Box, see WHEATSTONE BRIDGE.

Post-tertiary, see QUATERNARY.

Post-war Credits, see INCOME TAX.

Postage Stamp Collecting, see PHILATELY.

Postage Stamps, distinctive adhesive labels applied to letters, parcels, etc., handed to the post office for transit, and placed on the sev. packages, as a receipt for money prepaid for their carriage. Prior to the introduction of the penny post, as represented by the first adhesive P. S., the 1d. black and 2d. blue of 1840, Brit. postal rates depended on the distance a letter was carried, together with very stringent rules as to contents and weight. While a letter posted in London to a London address cost 2d., the fee rose by progressive stages, so that if it were carried for 20 m. it amounted to 6d. To take advantage of this rate a letter had to consist of only 1 sheet; if 2 sheets were used the rate was doubled, and if the letter weighed as much as 2 oz the fee was 7 times the minimum. These exorbitant charges greatly curtailed

correspondence, and Rowland Hill believed that if the rate were lowered to a uniform charge of 1d. for a letter of reasonable weight and the service reorganised (made possible by the coming of the railways), the increase in the use of the post would be so enormous as to justify fully such a drastic innovation. In 1837 he wrote a pamphlet entitled *Post Office Reform: its Importance and Practicability*, and gradually, with the help of James Chalmers, who submitted specimen stamps to him in 1838, persuaded the gov., who sponsored the necessary legislation. A public competition was held to decide the design of the proposed stamps, but though sev. thousand entries were received and 4 prizes awarded, yet the actual design settled upon, which was the joint work of Rowland Hill, Charles and Frederick Heath, Wm Wyon, and Henry Corbould, was not one of those submitted. The profile of Queen Victoria, which forms the centre of the stamps, was taken from a medallion of Wyon's struck in 1837 and resketched by Corbould.

The first adhesive P. S. ever to be issued in any country (originally they were called 'labels' and the gum 'cement'), 1d. black and 2d. blue, were put on sale on 6 May 1840, and despite much opposition and ridicule fulfilled, within a few years, Hill's greatest expectations. These 2 stamps, which for 7 years were the only ones available in Great Britain (similarly, the first Federal stamps issued in the U.S.A., the 5 cents and 10 cents of 1847, sufficed America for 4 years), were line-engraved by Frederick Heath, and printed by the firm of Perkins, Bacon, & Petch on paper, watermarked with a small crown, made by the firm of Stacey Wise. The 1s. stamp of 1847 was issued to meet the postal rate to the U.S.A. and some of the outlying colonies, being also the rate fixed for inland registration; the 10d. stamp of 1848 to meet the postal rate to France and some of the nearer colonies; the 6d. stamp of 1854 to meet the postal rate to Belgium and some other European countries. Soon afterwards postal rates for abroad began to fall; the 4d. stamp of 1855 represented the revised rate to France, the 3d. stamp of 1862 the revised rate to Belgium and Switzerland, the 9d. stamp of 1862 the revised rate to India, Australia, and Brazil. At one time or another Great Britain has issued stamps of the following values: 1d., 1d., 1½d., 2d., 2½d., 3d., 4d., 4½d., 5d., 6d., 7d., 8d., 9d., 10d., 11d., 1s., 1s. 3d., 1s. 6d., 2s., 2s. 6d., 5s., 10s., £1, and £5. All these stamps were produced to fulfil specific needs, particularly as, for many years past, stamps have been valid for revenue as well as postal purposes. At one period, though this custom has long since been given up, current stamps were over-printed with the names and for the use of certain gov. depts: Inland Revenue, Office of Works, Army, Admiralty, Board of Education, Gov. Parcels, and Royal Household. The first official stamp of this nature was a

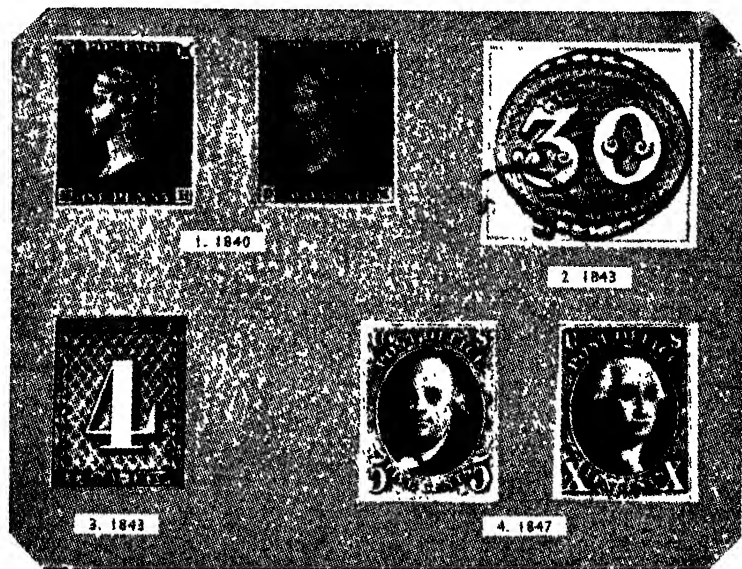
variant of the original black 1d., in the top corners of which the initials 'V R' replaced the Maltese cross of the normal stamp. This official stamp, however, though printed, was never put into service. The first 1d. stamp was printed from 12 different plates and the 2d. stamp from 2 different plates. In 1841 the colour of the 1d. stamp was changed to red, many new plates being added, and in the same year the 2d. stamp had a white line drawn on the design above and below the head and was reprinted in a different type of ink. One new plate was added.

The reason for both these changes was the fear that unscrupulous persons would delete the postmark (for years the post office experimented, earnestly but inconclusively, with a cancellation ink that could not be removed) and thus be able to use stamps a second time. The black of the 1d. had made postmarks difficult to distinguish, while the ink used in the printing of the first 2d., unlike the ink used in the printing of the second, was not fugitive, and thus did not reveal the effects of erasure. Another method of defrauding the post office was to cut off the upper and lower portions of 2 stamps where the postmark did not show and to join these halves together so as to form an apparently unused stamp. This was met in 1858 by fitting the check letters on the stamps, which had hitherto filled only the 2 bottom corners, into all 4 corners: thus 'A B—B A'. As these check letters ran almost through the alphabet, each stamp on the sheet of 240 exhibiting a different combination, the chance of 2 stamps being found with the same check letters was remote. Many other efforts were made, both in Britain and elsewhere, to counteract possible attempts at cheating, and in the sixties and seventies of the 19th cent. the U.S.A. even imposed a 'grill,' a mark like a harrow, upon its stamps, in order to break up the ink of the postmark and render its removal impossible. But since the introduction of chalk-surfaced paper at the end of the 19th cent., tampering with stamps has become much more hazardous, and though post offices never relax their vigilance, it may be said with assurance that the danger has been largely eliminated. Only one Brit. stamp, the 1s. of 1872, has been forged for the purpose of defrauding the post office. This stamp was used mainly in the London Stock Exchange for brokers sending telegrams to their clients, and it was a clerk in the telegraph office there who perpetrated the forgery, which was not discovered till 1898, when he was already dead.

Up till 1854, when Henry Archer's many years of experimenting with a perforating machine were finally successful, and his machine was adopted by the post office, stamps were issued imperforate and had to be cut from the sheet as required. This was a laborious process, and next to the invention of adhesive P. S., it is probable that Archer's invention has done more to popularise the use of the post than anything else. The lead

given by Great Britain in inaugurating adhesive P. S. was followed within a few years. The following countries, up to 1850, took advantage of the new system: 1843—Brazil (July); 1847—U.S.A. (Aug.) (from 1845 some cities in the U.S.A. had issued local stamps), Mauritius (Sept.); 1849—France (Jan.), Belgium (July), Bavaria (Nov.); 1850—New S. Wales (Jan.), Spain (Jan.), Victoria

many have been line-engraved, and many have been lithographed. But the most general systems in vogue in later times have been surface printing, recess printing, and photogravure printing from cylinders. This last, especially, makes for combined speed, cheapness, and accuracy, but the stamps produced, though excellent examples of mass workmanship, cannot compare in beauty or dignity with the



POSTAGE STAMPS : SOME FIRST ISSUES

1. 1840 *Great Britain*. The 1d. and 2d. of 1840 were the first two stamps ever issued.
2. 1843 *Brazil*. The first country to follow Great Britain's lead and issue postage stamps. The issue of 1843 consisted of three values: 30 reis, 60 reis, and 90 reis.
3. 1843 *Zürich*. This is a local stamp issued by the Swiss canton. The issue consisted of two stamps: 4 rappen and 6 rappen. Later in the same year Geneva also issued a stamp.
4. 1847 *United States of America*. These are the first two Federal postage stamps issued, though several cities had issued local stamps as early as 1845.

By courtesy of Frank Godden Ltd

(Jan.), Switzerland (April) (2 of the Swiss cantons had issued local stamps in 1843 and 1 in 1845), Austria (June), Brit. Guiana (July), Saxony (July), Prussia (Nov.), Schleswig-Holstein (Nov.), Hanover (Dec.). Soon there was no state of any importance that had not its postal system and its P. S. The effect of the 2 world wars has been to create numerous new stamp-issuing states, but many states that once issued stamps are no longer separate entities.

The actual printing of stamps has undergone many changes and modifications. Some early stamps were hand-set, some (including 3 Brit. stamps) were embossed;

original line-engraved stamps printed on steel. The most famous firms of Brit. printers of stamps have been Perkins, Bacon, & Petch, De La Rue, Waterlow, Nissen & Parker, Bradbury, Wilkinson & Company, Harrison and Sons, and Somerset House.

In 1957 Great Britain introduced experimentally at Southampton a machine to arrange letters for cancellation and sorting. This called for special stamps, the 1d.-3d. values, printed on the back with black lines in a naphtha-graphite substance of the trade name *Naphthadag*.

In the production of the world's P. S. many different kinds of paper have been

used, though by far the commonest are 'wove' and 'laid,' which may briefly be differentiated by the fact that wove paper has no lines in it, and laid paper has lines, although there are countless varieties of both. Many types of watermark have also been used, and though watermarking stamp paper is not a universal rule, every Brit. stamp, with the exception of the 1s. of 1847 and the 10d. of 1848, has been printed on watermark paper, of which over 20 varieties have been employed. Again, many sizes of gauge and types of perforation have been tried and even various qualities of gum, though it should be mentioned that, just as early stamps were imperforate, some early stamps were ungummed. Monocoloured stamps are usually, though not invariably, printed from a single plate; but when the centre of a stamp has a different colour from the surrounding frame it has to be printed from 2 plates, and it sometimes happens that one of them gets reversed. As for the shape of stamps, although there have been many divergences from the normal, such as the triangular shape of the early Cape of Good Hope stamps and the large size of some Brit. commemorative stamps, the fact remains that the size and shape of the very first P. S. set a fashion which has survived to this day.

As international postage increased in volume, many problems arose. A letter posted in one country, which had to pass through one or more other countries before reaching the country of destination, was subject to postal dues in any countries through which it passed. This led to a complicated system of international book-keeping and caused much inconvenience. However, this and other difficulties were smoothed out by the creation of the Universal Postal Union in 1874. A reciprocal arrangement was come to whereby only the country in which a letter was posted charged a fee for its carriage. Thus every country benefited roughly as much as it lost and the labour of keeping accounts was abolished. One of the early innovations agreed to by the Universal Postal Union, which, from 1875, held triennial meetings, was that low-face-value stamps of approximately the same value should, in every member country, be printed in the same colour, thus facilitating the work of post offices throughout the world. This arrangement lasted for many years, but with the collapse of currencies and the fluctuating rates of exchange it became somewhat modified. Owing to rising costs and need for revenue, the basic penny rate for inland letters in Britain, which had existed unaltered from 1840 to 1918, was finally abandoned. In the latter year it was increased to 1½d., raised to 2d. in 1920, lowered again to 1½d. in 1922, in 1940 raised to 2½d., and in 1957 raised to 3d. See also PHILATELY. See R. Lowe (ed.), *Empire Postage Stamps*, 1937; chapters in L. N. and M. Williams, *Philately*, 1939; J. Easton, *British Postage Stamp Design*, 1943, and *Postage Stamps in the Making*,

1949; R. Curle, *Stamp-collecting: a New Handbook*, 1946; R. Courtney Cade, *British Colonial Stamps in Current Use*, 1955; and L. N. and M. Williams, *The Postage Stamp, Its History and Recognition*, 1956.

Postern, or Sallyport, small gate in a medieval castle defended by a portcullis. It was used for the entrance and exit of secret messengers, or sorties.

Posters. A roll of 23 prehistoric P., alleged by Egyptologists to date back to the period of Dynasty VI, was found among the sarcophagi of the ruined pyramids of Sakkarah, Egypt. But the pictorial poster is essentially modern, and is but little older than the middle of the 19th cent. Jules Chéret is generally regarded as the father of pictorial P., the idea of which was quickly adopted in Great Britain and America. The P. of Toulouse-Lautrec in the 1890's signalled, among other things, the power of colour and design to seize attention. But Eng. pictorial P. prior to 1871 exhibited hardly any of the artistic merit that characterised the Fr. P. of Gavarni, though brave attempts were made by Godfrey Durand in a poster announcing the then newly-pub. *Graphic*, and by Walter Crane in a poster advertising a make of lead pencils. In 1871 Fred Walker designed his celebrated poster (now in the Tate Gallery) to advertise Wilkie Collins's dramatised version of *The Woman in White*, which was being produced at the Olympic Theatre in that year. Since that time many R.A.s and other notable artists have entered this particular field of activity, and it is hardly necessary to mention the coup of T. J. Barratt, who secured the celebrated picture of 'Bubbles' by Sir John Millais to advertise Pears' soap. Aubrey Beardsley introduced the flat poster, oriental in lack of perspective, and in bold and simple design the work of the 'Beggars' Brothers' (William Nicholson and James Pryde) remains in a class of its own. Later came the Dudley Hardy school of designs—bold in outline, arresting in subject-matter; while among other later artists of note in poster painting are John Hassall, E. McKnight Kauffer, who produced striking landscapes in 3 or 4 boldly handled colours, and A. R. Thompson, whose 'Street Markets' (1949) has pointed to a school of future P. in which boldness of outline is not incompatible with a wealth of detail.

The London Co. Council have passed a by-law prohibiting the exhibition of any pictorial poster where such poster may disfigure a highway, landscape, place of natural beauty, or public pleasure-ground. Bill-posting generally has become so important a factor in the business life of the nation that there exist societies like the London Billposters' Protection Association and the Billposting Contractors for the protection and advancement of the general interests of the bill-posting trade. The first-named society exercises through its censorship committee a healthy supervision over P. generally, though that body and the London Co. Council do not always concur in what is desirable

and what is not. An attack on advertisement by P. was made in 1913 by the Bill for the Regulation of Advertising, which proposed unsuccessfully to empower every local authority to prescribe the shape and colour of P. in its own area. In the period between the outbreak of the First World War and the introduction of conscription successful use of P. was made for recruiting purposes, the 'Kitchener poster' being famous. After the armistice the newspaper advertisement columns were filled at a quicker rate than the poster hoarding, and it seemed for a time as if the advertiser had less faith in the value of this medium. But by 1930 good hoardings were at a premium, the chief competitors for space appearing to be the cinematograph theatres and breweries. A successful poster campaign was that of the Empire Marketing Board (q.v.), the purpose of which was to induce people in Britain to purchase empire goods. Among advances in poster art after 1920 the P. displayed by the main-line railway companies have been outstanding, while those of the Underground Railway won recognition not so much on account of some outstanding specimens of artistic merit as for boldness and originality displayed in the use of small space, and some commercial firms have produced outstandingly impressive or comic P., such as Shell-Mex and Guinness. During the Second World War the art of P. was brought almost to a standstill, except for those issued by the gov., because of the paper shortage. After the end of the Second World War the reappearance on a large scale of commercial P. has shown that the artistic consciousness which was being developed in poster art before 1939 has not been entirely lost. In 1949 an exhibition of London Transport P. was held at the Victoria and Albert Museum, London: a more recent choice of P. was given in the 'Art in British Advertising' exhibition, 1955. See also ADVERTISING. See C. Hiatt, *Pictorial Posters*, 1895; E. McKnight Kauffer, *The Art of the Poster*, 1924; *Studio Special Number: Posters and Publicity*, 1926; and *Commercial Art Annual: Posters and Publicity*, 1927.

Postliminium (Rom. law *post*, after; *limen*, threshold), term adopted in modern international law from the *jus postliminii* of Rom. law to indicate the fact that ter., individuals, and property, after having come in time of war under the power of an enemy, return either during the war or on its termination under the power of their original nation. This may happen by reason of evacuation of ter. by the enemy, reconquest by the former owner, reconquest by a third nation followed by restoration to the former owner, or restoration by the terms of a treaty of peace. Strictly the title of P. is unnecessary to describe an obvious state of facts, and, indeed, the real difficulty in P. cases is to determine the validity or otherwise of acts done in relation to re-vested property during its ownership by an enemy. Again, other liabilities may arise, e.g. if a ship has

been captured and is recaptured, P. re-vests the ship only in the original owner, subject to the obligation to pay salvage. Most modern international lawyers restrict P. to ter. and ships, and apply the principle of P. to movables only if they be promptly recaptured.

Postojna (Ger. *Adelsberg*), tn in Slovenia, Yugoslavia. It is in the dist. of Carniola (q.v.). Here the underground riv. Pivka enters the famed caves of P., which are filled with fantastically-shaped stalactites and stalagmites. The riv. contains the curious amphibian *Proteus anguinus* (q.v.). Pop. 3700.

Pot-holes, or **Giant's Kettles**, cavities varying in diameter and depth, formed in a stream-bed where pebbles or boulders lodged in accidental depressions are driven round by the water and scour out deep hollows, either basin- or pipe-shaped. For speleology of P. see CAVES.

Potash, see POTASSIUM.

Potash Water, see AERATED WATERS.

Potassium, symbol K, atomic number 19, atomic weight 39.10. It was first isolated by Davy in 1807 by the electrolysis of melted caustic potash, and occurs in the form of silicates in rocks such as feldspar, e.g. orthoclase is KAlSi_3O_8 , and mica. Through weathering action these rocks are broken up and the P. salts pass into the soil, from which they are taken up by plants. P. is an essential constituent of plant food; when plants are burned the P. is left in the form of the carbonate, and this was formerly the chief commercial source of P. compounds. Part of the P. salts find their way into seas, lakes, and mineral springs. When inland seas evaporate, the more insoluble salts, e.g. common salt, are first deposited, and then the more soluble salts, chiefly those of P. and magnesium. In this way the Stassfurt deposits, which with the deposits in Alsace now constitute the chief source of P., were formed; the more important compounds being carnallite ($\text{KCl} \cdot \text{MgCl}_2 \cdot 6\text{H}_2\text{O}$), sylvinite (KCl), kainite ($\text{MgSO}_4 \cdot \text{KCl} \cdot 3\text{H}_2\text{O}$). When Davy obtained the metal by electrolysis of caustic potash, globules of metal appeared on the negative wire. It was prepared at one time by heating P. carbonate with finely divided carbon: $\text{K}_2\text{CO}_3 + 2\text{C} = 2\text{K} + 3\text{CO}$. The vapour of the metal tends to combine with carbon monoxide to form an explosive compound, P. carbonyl, $\text{K}(\text{CO})_n$, and the yield is thus reduced. This method was replaced by the Castner process, in which caustic potash was heated in iron crucibles with carbide of iron. The resulting P. was distilled off and collected. Both these methods gave place to the modern electrolytic method, in which fused P. chloride is electrolysed. P. is a soft silvery-white metal, melts at 63.5° , boils at 757° , and has a sp. gr. of 0.859. P. and its compounds give a lilac tint to the Bunsen flame. P. oxidises in moist air, and combines with the halogens more vigorously than sodium does. It reacts with water so vigorously that the evolved hydrogen catches fire and burns with a lilac flame. On account

of its reaction on water and air, it must be kept in sealed tins or in naphtha, which does not contain oxygen and is incapable of dissolving a sufficient amount of oxygen from the air to permit much oxidation of the P. P. forms a liquid alloy with sodium.

POTASSIUM COMPOUNDS: *Potassium hydride*, a white crystalline solid, is formed when hydrogen is passed over P. heated to 380°C . It acts upon water, forming caustic potash and hydrogen. *Potassium monoxide* (K_2O), a yellow solid, is obtained by heating potassium nitrate with P. *Potassium tetroxide* (K_4O_7), formed when the metal burns in oxygen, is a yellow powder which is decomposed by water, forming P. hydroxide, hydrogen peroxide, and oxygen:



Potassium hydroxide, obtained: (a) by acting on water with P.; (b) by boiling P. carbonate with milk of lime; (c) by electrolysis of aqueous P. chloride using special precautions (see SODIUM). It is a white amorphous substance which melts at 360° , and absorbs moisture from the air. It is used to absorb gases, e.g. carbon dioxide. It readily dissolves in alcohol, and the alcoholic solution is often used in organic chem. where water would cause decomposition. It is used in making soap. *Potassium chloride*, obtained from carnallite, is used in the preparation of other compounds and as a manure. *Potassium bromide*, a white solid, crystallises in cubes, and is useful in medicine in cases of nervous disease, and as a hypnotic, and also in photography for preparing silver bromide. *Potassium iodide* occurs in cubic crystals, useful in medicine and photography. *Potassium chlorate* is now largely obtained by electrolysis of a hot solution of P. chloride. It is useful as an oxidising agent, e.g. in the preparation of the dye aniline black, in fireworks, and in making matches, and is also used in medicine. *Potassium carbonate* is a white salt, extremely soluble in water. It is largely used in the manuf. of other P. compounds. *Potassium bicarbonate* is a white crystalline solid which decomposes when heated, evolving steam and carbon dioxide, and leaving normal P. carbonate. It is used in medicine, e.g. in dyspepsia and gout. *Potassium nitrate* occurs naturally in rich soils. It is a white crystalline solid. It is largely used in the preparation of gunpowder, and in medicine (e.g. for asthma, when porous paper is soaked in the solution, dried, and ignited, and the fumes inhaled), and as a food preservative. *Potassium cyanide* crystallises in cubes extremely soluble in water. It is highly poisonous. It is a reducing agent, and is therefore useful in blowpipe analysis, e.g.:



It is useful in electroplating. Large amounts of the cyanide are used in extracting gold from its ores, particularly in the Transvaal.

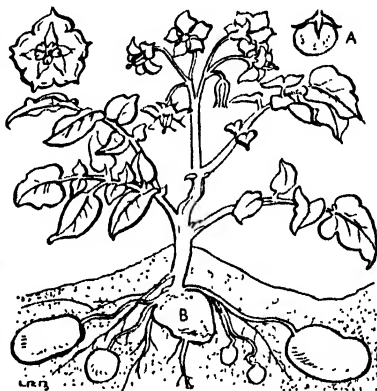
Potassium Antimonyl Tartrate, see TARTAR EMETIC.

Potassium Bitartrate, see CREAM OF TARTAR.

Potassium Chlorate, see POTASSIUM.

Potassium Nitrate, see POTASSIUM.

Potato, or *Solanum tuberosum*, plant (family Solanaceae), the underground tuberous stems of which constitute the most important vegetable crop in Britain. It was introduced from America into Britain in the 16th cent. by Sir Walter Raleigh, but had been brought a little earlier to Italy and Spain. For nearly 200 years it was not recognised as a valuable food product, and it is only since the middle of the 19th cent. that attempts have been made to improve the quality and cropping powers of the tubers. Great numbers of new varieties, obtained by cross-fertilisation of the flowers, have been introduced from time to time,



POTATO

A, Seed vessel. B, Seed tuber.

and the best appear gradually to decline in value, becoming less productive and more susceptible to disease. Varieties are classified as early, maincrop, and late. In ordinary practice the crop is grown from tubers, the eyes of which are buds that can develop into new plants. Much superior crops are obtained by sprouting the 'seed' tubers in shallow wooden trays where they are exposed to light and air, and thoroughly greened. Tubers so prepared can be left to be planted until weather and soil are in a suitable condition, and not only mature earlier but produce considerably heavier and healthier crops. P.s do best in a warm and comparatively dry climate, with a deep sandy loam and porous sub-soil. From 12 to 18 cwt. of sets are required per ac. The early varieties are planted in Feb and Mar.; drawing the earth up to the rows

is an important protection against frosts. The main crop and late varieties after lifting are stored in straw-covered clamps or piles. The P. is subject to many pests and diseases, and P. blight (*Phytophthora infestans*), viruses, and eelworms are well known. These are controlled by the use of healthy seed with proper rotation of crops, and in the case of blight by spraying with Bordeaux mixture. The value of spraying the foliage with Bordeaux mixture, composed of copper sulphate and lime, has been repeatedly demonstrated, and this practice by growers is steadily on the increase. In 1846 and 1847 Ireland was subjected to extreme famine owing to the failure of the P. crop. Work is now in progress on the production of varieties resistant to blight and eelworm, and free from virus diseases. See W. G. Burton, *The Potato*, 1948, and R. N. Salaman, *The History and Social Influence of the Potato*, 1949.

Potato Beetle, see COLORADO BEETLE.

Potato Spirit, see FUSIL OIL.

Potchefstroom, tn in the S. of Transvaal prov., S. Africa, on the Mooi R., 94 m. SSW. of Pretoria. It is in the centre of an agric. and gold-mining area and is a popular health resort. It is the oldest tn in the Transvaal, and was founded by Voortrekkers crossing the Vaal in 1838, and named after their leader, Potgieter. The first shots against Brit. troops were fired at P. in 1881. P. is the H.Q. for the Western Transvaal Command. There is an agric. college and a univ. college which was incorporated as a constituent college of the univ. of S. Africa in 1921. Pop.: Whites, 16,708; Bantu, 13,348; Coloured, 1459; Asiatics, 476.

Potëmkin, Prince Grigoriy Aleksandrovich (1739-91), Russian statesman, favourite of Catherine II, of obscure origin. From 1774 P. was viceroy of New Russia (q.v.), from 1784 F.-M. and president of the war dept. In 1783 he persuaded the Crimean Khan to abdicate in favour of Catherine, and the Crimea was annexed to Russia. When Catherine visited New Russia in 1787, P., to make it appear more populated than it was, put up faked villages—hence the expression 'P. villages.' See life by G. Solov'yechik, 1948.

Potential, see POTENZA.

Potential, Electric, is analogous to temp., and to pressure in hydrodynamics. When two conducting bodies A and B are allowed to touch, a flow of positive charge from A to B indicates that A is at a higher P. than B. The difference of P. between 2 points can be defined as the work done against the electric forces in bringing one positive unit of electric charge from one point to the other, the state of the field supposed to be unaltered by the transference. The P. of any point in space can be defined as the work which must be done in bringing up to the point from an infinite distance a particle charged with unit positive quantity of electricity. Consider the P. at a point P, at a distance r from a charge (at O).

Suppose the charge is positive, and concentrated at a point—O. Join OP and

produce to a great distance. Let Q, R, S be points on OP, distant r_1, r_2 , etc., from O.

O P Q R S T

The force at P is $\frac{e}{r_1^2}$, at Q it is $\frac{e}{r_1^2}$, at R

it is $\frac{e}{r_2^2}$, and so on. Suppose Q, R, S are close together, so that r_1^2 is almost the same as r_2^2 and both can be put as equal to r_1^2 , and so on. Let v_1, v_2 , etc., be P.s at Q, R, S, etc. Then $v_1 - v_2 = e(r_2 - r_1)$, because the work done from

R to Q on unit positive charge is equal to the difference of P. and also to the product of the force and distance. Also $v_2 - v_3 = e(r_3 - r_2)$. $\therefore v_1 - v_2 = \frac{e}{r_1} - \frac{e}{r_2}$, $v_2 - v_3 = \frac{e}{r_2} - \frac{e}{r_3}$, and so on; adding all such

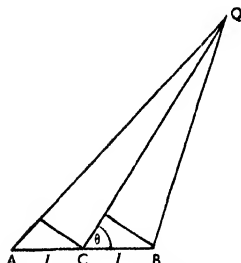
terms together to a point distant r_n from O, we get $v_1 - v_n = \frac{e}{r_1} - \frac{e}{r_n}$. Let Q coincide with P, and let r_n be infinite. Then v_n will be zero and $\frac{e}{r_n}$ will be zero. There-

fore the P. at P is $V = \frac{e}{r}$. The absolute electrostatic (e.s.u.) of P. difference is defined as existing between 2 points when the work done in taking unit charge from one point to the other is 1 erg. The practical unit of P. difference is 1 volt and equals 1/300 e.s.u. Application of the concept of P. gives a concise explanation of many electrostatic phenomena. Take, for example, electrostatic induction (q.v.). It was seen that in bringing up a conductor, AB, of cylindrical shape to a positively charged body, C (see fig. in INDUCTION, ELECTROSTATIC), the end of the cylinder nearest the charged body became negatively electrified, and the other end positively electrified. Now the charged body, C, sets up an electric field, the P. in which diminishes as the distance from A increases. When AB is brought into this field, the end B near O is at a higher P. than A. Thus, since AB is a conductor, electricity will flow from the end B to A until the P. is uniform. Therefore B becomes positively electrified and A becomes negatively electrified. See ELECTROSTATICS.

Potential, Magnetic. The difference in magnetic potential between 2 points is defined as the quantity of work required to carry unit positive pole from one point to the other (see POTENTIAL, ELECTRIC). The potential at a point is the work required to bring a unit pole from infinity to that point. It can be shown, just as in the case of an electric charge, that the potential due to a pole m is $\frac{m}{r}$.

It must be emphasised that an isolated magnetic pole does not exist. Poles always occur in pairs, unlike electric

charges, and a really satisfactory theoretical treatment would consider magnetic dipoles.



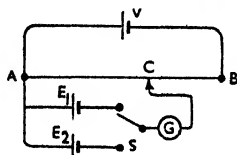
Potential Due to a Magnet. Let AB be the magnet with centre C; Q be the point distant r from C and $\angle CQB = \theta$. Thus the potential at Q due to m at A is $\frac{m}{AQ}$, that due to $-m$ at B is $-\frac{m}{BQ}$. Thus the potential, V , due to the whole magnet is

$$V = m \left(\frac{1}{AQ} - \frac{1}{BQ} \right) = m \left(\frac{1}{r + l \cos \theta} - \frac{1}{r - l \cos \theta} \right) = \frac{2ml \cos \theta}{r^2} = \frac{M \cos \theta}{r^2}$$

See also MAGNETISM.

Potentiella, genus of herbs and shrubs (family Rosaceae) with pinnate or palmate leaves, and generally yellow or white flowers, followed by an etaerio of achenes. Brit. species include *P. sterilis*, the barren strawberry; *P. erecta*, common tormentil; *P. fruticosa*, *P. palustris*, *P. rupestris*, *P. argentea*, and *P. reptans*, the Cinquefoils; and *P. anserina*, silverweed or goose grass. Sev. species are grown in gardens.

Potentiometer is one of the best instruments for comparing or measuring electric potential differences. It uses a 'zero' or 'null' method, i.e. one in which zero deflection is observed; and therefore in measuring the e.m.f. of batteries no current is taken from them, and the true e.m.f. may be found. In its simplest



form the P. (see fig.) consists of a single wire AB of manganin or platino-iridium, usually 1 metre in length. A standard cell E_1 (a Weston cell of 1.01859 volts at 15°C .) is connected to the end A; the negative terminal being joined through a switch (S) and a galvanometer (G) to the

sliding contact (C). The difference of potential produced by the battery (V, 2 volts) between A and C tends to send a current through the circuit AECG, while the e.m.f. of the standard cell (E_1) tends to drive current in the opposite direction. By adjusting the position of C the potential difference (p.d.) between A and C can be made to equal the e.m.f. of the standard cell, and under these conditions no current will flow in the cell circuit and no deflection of the galvanometer will be produced. If the wire AB is uniform the potential drop along unit length is then given by E_1/AC . The e.m.f. of a cell E_2 ($< V$ volts) can then be found by operating the selector switch S and finding the new position (C₂) for no deflection of G. Then $E_2 = \frac{E_1}{AC} \cdot AC_2$. The P. can be used to measure

a resistance R by passing a steady current through a standard resistance in series with R and comparing the p.d.s across the two. The ratio of the p.d.s is then the ratio of the resistances. A current can be measured by causing it to flow through a standard resistance and by determining the p.d. across it. Ohm's law is then applied.

The P. described has been developed along sev. lines. The wire AB can be made much longer (e.g. 10 metres), allowing greater accuracy or a greater range of p.d. The current through AB can be adjusted by a resistance in series with V to allow a simple relation to be established between the position of C and the p.d. to be measured. Frequently, the wire AB is replaced by a series of standard resistances, thereby removing errors caused by non-uniformity of the wire. The galvanometer is usually protected by a series resistance which can be shorted out to give greater sensitivity near balance. One of the more difficult errors to avoid is that arising from thermoelectric effects (see THERMOELECTRICITY).

Potenza: 1. Prov. of Italy, in W. Basilicata (q.v.). It is mountainous and has many high peaks of the S. Apennines (q.v.). In the extreme N. is part of the broad valley of the Ofanto, and in the SW. there is a short coast-line on the Tyrrhenian Sea. The prin. tns include P., Molfi, and Avigliano (qq.v.). Area 2780 sq. m. Pop. 456,000.

2. (anc. Potentia) It. tn, cap. of the prov. of P., and chief tn of Basilicata, 190 m. ESE. of Rome (q.v.). It is in the Apennines, 2700 ft above sea-level. In anc. times P. was the capital of Lucania (q.v.). It suffered severely in an earthquake in 1857, and there was much damage during the Second World War. There is a cathedral (12th-18th cents.), and sev. medieval churches. Pop. (com.) 32,900.

Poti (anc. Phasis), seaport in Georgia, on the Black Sea at the mouth of the R. Rioni. It is at the centre of Colchis (q.v.), and exports manganese from Chiatura (since the 1880's). P. has been known since the 5th cent. BC as a Gk colony; it was a Turkish fortress until captured by Russians in 1828. Pop. (1939) 16,000.

Potlatch, a competitive feast among the Indians of Brit. Columbia, given by individuals and clans to acquire high status and prestige. Blankets, plates of copper, and slaves were given or destroyed. The custom is now prohibited. See M. Mauss, *The Gift* (Eng. trans.), 1954.

Pot'ma, railway station in the Mordva Autonomous Rep. (central Russia). There is a forced-labour camp used since the 1940's as a transit camp for foreign prisoners before release and repatriation.

Potomac, riv. of the E. U.S.A., rising in 2 branches in the Allegheny Mts, and flowing as the boundary between Maryland and W. Virginia and Virginia in a winding SE. course, to fall into Chesapeake Bay. Its chief tribs. are the Shenandoah and the Monocacy. At Washington, 115 m. from its mouth, the riv. becomes tidal and navigable. Length 285 m.

Potosí: 1. Upland dept of SW. Bolivia, bounded by Chile on the W. and Argentine on the S.; it has silver, gold, tin, and copper mines; bismuth, zinc, and lead are also important. Area 41,297 sq. m. Pop. (est.) 534,400.

2. Cap. of the above prov., on the Cerro de P. (altitude 13,525 ft), 50 m. SW. of Sucre. It is gradually falling into decay, but has a univ., a fine granite cathedral, and a mint. The silver mines, discovered in 1546, and now nearly abandoned, were the cause of its early prosperity. Gold is still mined, and tin, zinc, and bismuth are profitable. Pop. 45,760.

Pototan, tn in the prov. of Iloilo, is. of Panay, Philippine Is. Pop. 34,717.

Potresov, Aleksandr Nikolayevich (1869-1934), Russian Social Democrat. He co-operated with Lenin in the Iskra (q.v.) organisation, but soon found Lenin's opportunism and lack of moral scruples intolerable. After the revolution of 1905-7 he became leader of the Right-wing Mensheviks (see MENSHEVIKS). After the October revolution (q.v.) in 1917 P. refused to join the Menshevik party because he thought its policy of only legal opposition to the Bolsheviks too restrained. He emigrated in 1927 and continued to expose the Bolshevik system.

Potsdam: 1. Dist. (*Besirk*) of the Ger. Democratic Rep. (E. Germany), bounded N. by Neubrandenburg, E. by Frankfurt, S. by Kottbus and Halle, and W. by Magdeburg and Schwerin (qq.v.). Area 4682 sq. m. Pop. 1,180,000.

2. Ger. city, cap. of the dist. of P., and former cap. of Brandenburg (q.v.), on the Havel, at the SW. outskirts of Berlin. It lies partly on an is., the *Potsdamer Werder*. It dates from the time of Frederick William, the Great Elector (q.v.), and has long been looked upon as a centre of Prussian militarism. The tn was the second royal residence of Prussia, and has fine buildings of the 17th and 18th cents.; of these the most notable is the *Sans Souci* (1745-7), the palace of Frederick II, whose tomb is in the garrison church. Pop. 110,000.

Potsdam Agreement, agreement arising out of the 3-power conference held at Potsdam, 16 July-1 Aug., 1945, between Churchill and Attlee for Great Britain, Truman for the U.S.A., and Stalin for the U.S.S.R., together with various ministers and chiefs of staff of these countries. The conference was called to determine the future of Germany after the unconditional surrender of 7 May, 1945. Certain frontier changes had already taken place, particularly in relation to Poland's new boundaries (see POLAND, *History*). The P. A. provided that: (1) A committee of foreign ministers of the U.S.A., U.S.S.R., Britain, France, and China should be estab. to frame peace treaties with Germany's allies, to be submitted to the U.N. (2) The commanders-in-chief of France, Britain, the U.S.A., and the U.S.S.R. should exercise supreme authority in their respective Ger. zones, on instructions from their govts., and also jointly, as members of the control council in affairs concerning the whole of Germany. (3) The Allies should disarm and demilitarise Germany and prevent the future use of Ger. industry for war purposes. Nazism should be entirely destroyed and the Ger. people made aware of their defeat, and re-educated on democratic lines. For the present no central Ger. Gov. should be estab., but Germany should be treated as one economic unit. (4) It was agreed that Königsberg should be transferred to the U.S.S.R., and special provisions were made concerning reparations due to the U.S.S.R. The Oder-Neisse line was made the provisional Polish W. frontier, its final confirmation to await the peace conference. (5) War criminals should be brought to trial, and any transfer of Germans from Poland, Hungary, and Czechoslovakia should be humanely carried out. For further developments after the P. A. see GERMANY, *History*.

Pott, Percival (1713-88), surgeon, b. London. At the age of 16 he was apprenticed to a surgeon at St Bartholomew's Hospital, to which he was appointed assistant surgeon (1745) and surgeon (1749). P. lived to become the greatest surgeon of his day: he was a kindly, charitable man, very popular with his students. His important surgical writings include books on ruptures (1756), head injuries (1760), fractures and dislocations, in which he described the fracture of the fibula since known as 'Pott's fracture' (1768), hydrocele (1762), chimney sweep's cancer of the scrotum (the first time an occupational cancer had been described, 1775), and 'Pott's disease' of the spine (1779). His *Surgical Works* 1790, include a life.

Pott, paper size, see PAPER.

Potter, Beatrix (1866-1943), authoress of tales for children, b. London. In 1896 she first visited Saurey, a little village in the Lake District, where eventually she bought a farm and settled. In 1913 she married William Heelis, solicitor, of Ambleside. She will be remembered as the authoress of *Peter Rabbit*, 1902, and

other nursery masterpieces. Among the best are: *Squirrel Nulkin*, 1903, *Benjamin Bunny*, 1904, *Mrs. Tiggy-winkle*, 1905, *Miss Moppet*, 1906, *Jemima Puddle-Duck*, 1908, *Ginger and Pickles*, 1909, and *Pigling Bland*, 1913. In her small and special sphere she conveyed truth through fantasy, enlarging the reader's perception of life by poetic means. Of the story books which appeared after her marriage only 1, *Johnny Town-Mouse*, 1918, can be compared in style or creative effort with her earlier work. The others, including *The Fairy Caravan*, 1929, *Sister Anne*, 1932, and *Wag-by-Wall*, 1944, are less happy experiments addressed to her Amer. public. See Margaret Lane, *The Tale of Beatrix Potter*, 1946.

Potter, Paulus (1625-54), Dutch animal painter, b. Enkhuizen, trained by his father. Some of his best pictures are: 'The Young Bull' (Hague), 'The Dairy Farm', 'The Herdsman', 'Orpheus', 'Equestrian Portrait of Tulf', and 'Landscape with Cattle' (at Munich). See W. von Hode, *Meister der holländischen und vltimischen Malerschulen*, 1921.

Potter, Stephen (1900-), humorous writer, was educ. at Westminster and Merton College, Oxford, and was then a lecturer in Eng. at various univs. In 1930 he pub. a study of D. H. Lawrence and in 1935 one of Coleridge. He is chiefly known by his books *The Theory and Practice of Gamesmanship*, or *The Art of Winning Games Without Actually Cheating*, 1947, *Some Notes in Lifemanship*, 1950, and *One-Upmanship*, 1952. His humour consists of a scientific and sympathetic analysis of different types of humbug, which he solemnly describes as a principle to be followed. A later book was *Sense of Humour*, 1955.

Potteries, The, popular name for the six towns comprising the city of Stoke-on-Trent (q.v.).

Pottery, collective term formerly denoting all kinds of ceramic ware, but nowadays only applied to STONEWARE, DELFTWARE, SLIPWARE, MAJOLICA, HISPANO-MORESQUE WARE, EARTHENWARE, and FAIENCE (qq.v.). It no longer refers to PORCELAIN or CHINAWARE (qq.v.). See also PERIAN ART.

Pottstown, bor. of Pennsylvania, U.S.A., in Montgomery co. on the Schuylkill R., 18 m. ENE. of Reading. There are iron and bridge works, boiler shops, etc. The Hill School for boys is here. Pop. 22,590.

Pottsville, city of Pennsylvania, U.S.A., co. seat of Schuylkill co., at the junction of the Norwegian and Schuylkill R.s., 48 m. NE. of Harrisburg. It is the centre of an anthracite coal dist., and there are manufs. of iron and steel and textiles. Pop. 23,640.

Pouched Mouse, or Kangaroo-rat, names applied to species of *Dipodomys*, a genus of rodents in the family Heteromyidae. There are in all 12 species of these jerboa-like creatures all belonging to N. America. They are burrowing animals, with long hind limbs and tails, and cheek-pouches. *D. merriami* and *D. philippi* are well-known species.

Poudré Weather, see SNOW.

Poughkeepsie, city and co. seat of Dutchess co., New York, U.S.A., on the Hudson R. c. 65 m. N. of Manhattan. It is a manufacturing centre for ball bearings, cream separators, business machines, auto parts, hardware, iron castings, precision instruments, cigars, clothing, buttons, and pharmaceuticals. It is noted for its educational institutions, Vassar College, at nearby Arlington, being one of the most famous women's colleges in America; Marian College and Oakwood School are also here. P. Annual Intercollegiate Regatta was held here till 1950. Pop. 41,023.

Poulenc, Francis (1899-), Fr. composer, b. Paris, studied piano with Ricardo Viñes and composition with Charles Koechlin. He was a member of the group of young composers known as 'Les Six,' and was musically influenced by Erik Satie and in a general artistic way by Jean Cocteau. In 1917 his work began to attract attention, and by 1924 Diaghilev had commissioned the ballet *Les Biches* from him. Other sizable works are the *opéra-bouffe Les Mamelles de Tirésias* (1944), music for various plays and films, Mass and *Stabat Mater* for unaccompanied voices (1937 & 1951), cantata *Figure humaine* to words by Eluard (1943), *Concert champêtre* for harpsichord (1928), *Concertos* for 2 pianos (1932) and for organ (1938), a Sextet for wind and piano (1932) and a string Quartet (1946); but his most characteristic work, always charming and always very much alike, is among his numerous piano pieces and over 100 songs.

Poulo-Condore, group of 12 small is. in the China Sea, 97 m. SE. of Cap St Jacques, Cochinchina (q.v.), and 45 m. from the mouths of the R. Mekong (q.v.). Occupied at different times by Malays, Khmers, and Vietnamese, P. was taken over by the Brit. E. India Company in 1702 and a fortified factory was built there. In 1705 the Macassar servants of the Company mutinied and massacred all the British. It was later used as an is. prison by the French.

Poulsdon, see POLENDEN LACEY.

Poultice (from the Lat. *puls*, pottage), application to some part of the body with the object of promoting counter-irritation in the case of inflamed tissues or organs, of relieving pain generally, of accelerating suppuration, or of stimulating or soothing the skin.

Poultry, see CHEAPSIDE.

Poultry and Poultry Keeping. The keeping of poultry for the production of eggs and flesh dates from a remote period of civilisation. A theory shared by Darwin was that all the domesticated breeds of poultry were derived from *Gallus bankiva*, a bird which inhabits N. India, Burma, Malay Peninsula, and the Malayan Archipelago, and though he admitted the lack of good evidence of the theory, he drew attention to the well-known tendency of many of the breeds, now widely different in external characteristics from *Gallus bankiva*, to revert to its type. Probably it occupied centuries of careful

selection and breeding to produce a strain of birds capable of continued laying; but it is a remarkable fact that since breeding has been undertaken on modern scientific lines the average egg production has increased more rapidly in a half-century than in those many previous centuries. The ordinary fowl's yield of about 150 eggs in 12 months results in a profit after all charges are paid. To increase such an average yield for a large flock is to enhance the profits more rapidly than the expenses. Of the many factors which contribute towards profit on poultry, strain is the most important, for egg production is undoubtedly a Mendelian or inherited characteristic. Only the best layers, past their first moult, or at least in their second year, should be used in the breeding pen, and the male bird should come of a large egg-laying strain.

THE DOMESTIC FOWL. Breeds. The most popular layers are Leghorns, Anconas, Light Sussex, and Rhode Is. Red, the last-named being a favourite. Two good cross-breeds are the Legbar, a cross between a Brown Leghorn and a Canadian Barred Rock, and a variety which is a cross between a Leghorn and a Rhode Is. Red.

Rearing. When chicks are hatched out naturally by the broody hen (*see below*), the hen and her chicks should be housed in a fold with a portable run attached. When day-olds are purchased from a reliable breeder and no broody hen is available the chicks are reared in an artificial brooder, which may be heated by an oil-lamp or electric heater and has a part curtained off to retain the warmth. The temp. in the hover should be regulated according to the state of the chicks. If chicks are found to be always packed together more warmth is needed: if found standing around looking rather sleepy, less heat is required. As the chicks get older the temp. in the hover is gradually reduced. Chicks are usually ready to be taken away from the brooder after 5-7 weeks and moved to a larger house with a run. The next stage is when the pullets reach the point of lay period (5-7 months). Female poultry stock are advertised as: (1) pullets (birds up to 12 months old); (2) yearlings (12-24 months); and (3) hens (over 24 months).

Feeding. Laying birds are usually fed *ad lib.*, but on average consume about 5 oz. of food per day. The ration may include some whole corn or be wholly in meal form. However the ration is compiled, it should contain 18 per cent of protein and not more than 10 per cent of fibre or 7 per cent of oil. The hen has a high mineral requirement for lime and phosphate because of the egg-shell which she must make, and so a plentiful supply of crushed oyster shell must always be available. Also where P. are kept in laying batteries they have no access to natural food, and must be supplied with a diet complete in vitamins. The provision of a good supply of drinking-water is important, but not always fully appreciated.

Accommodation. Traditionally P. have been kept out of doors either on a free range, with a house where they sleep and lay their eggs, or moved over the ground in lightly constructed fold-units which can be moved by hand each day. In the sleeping-quarters of these houses the birds require 2 sq. ft. of floor space each, and must have good perches and nesting-boxes. In these outdoor systems the birds are foragers, and therefore find a proportion of their own food, exercise themselves and keep healthy, and do a considerable amount of good to the land by their scratching and the manure they leave behind. Feeding the birds is fairly easy, and where they are on a free range very little labour is required. However, where the birds are folded over the land, moving the fold-units each day becomes an expensive item. Disadvantages are apparent in both systems, and have resulted in a marked decline in their popularity. In the first place the P. are exposed to the weather, and even if it is not severe many dirty eggs may be produced in a wet time. Also it is not practicable to have lights in the houses so as to increase the length of day artificially—a practice which increases egg yields in winter—and so egg yields are low compared with indoor systems of housing. And finally, innumerable failures in P. keeping are due to foul ground or the ravages of foxes and other predators.

Laying Battery. Under this system layers are confined in a cage of some 18 in. by 14 in. Although this is considered to be cruel by many poultry keepers, the birds lay extremely well, and it also enables the poultry keepers to note the bad layers. The cages are constructed so that the egg rolls gently down the sloping wire tray on which the bird stands to the egg rack in front. It is essential that the droppings boards or trays should be cleaned daily.

Deep-litter and Straw Yards. These are similar systems, but in the former a house is often built specially whilst in the latter disused cattle yards are frequently converted for poultry keeping. In both plenty of litter is provided in which the birds can forage and exercise themselves. By electric lighting a day length of 14 hrs can be maintained artificially, and so egg yields are high. Thus these 2 methods of housing can be regarded as seeking to combine the advantages of outdoor and indoor poultry keeping.

Broody Hens. If the hen is required for 'sitting,' the setting of eggs (usually 13 under large birds and 9 or 11 under light strains) should be placed in proper nesting boxes in a quiet corner, and the hen fed once daily. The bird should come off the nest for 20 min. voluntarily each day, and care must be taken not to disturb it after it has been sitting for 19 days. If the hen is not required to sit it should be placed in a small coop with a barred front and bottom, situated in full sight of the other birds, and fed well; as it is unable to sit comfortably the hen soon recovers from its broodiness.

Artificial Incubating. There are many makes of incubator. The incubator must be placed in a well-ventilated position where there is no draught, and the heating apparatus regulated to maintain a steady temp. of 100° (*see also* INCUBATION AND INCUBATORS).

Common Diseases. *Aspergillosis*, a growth of moulds in the breathing organs, may attack any kind of bird. Infection occurs from mouldy litter or food. There is no treatment which can be recommended, but prevention is possible by avoiding mouldy litter and food. Mouldy corn, not mashes, can be rendered harmless by boiling. Chilling is a contributory cause. *B.W.D.* (Bacillary White Diarrhoea) is a highly fatal infection in young chicks, in which white diarrhoea is often present. Infected adult stock act as 'carriers,' and hens may pass on infection in the egg and with their droppings. Carriers may be detected by a blood agglutination test and the source of infection thus eliminated from a flock. Owing to mass methods of artificial incubation, the disease has assumed great importance. Under the Ministry of Agriculture scheme, 'Approved Hatcheries' have breeding stock regularly blood tested and adopt certain precautions with regard to hatching eggs and incubators. Hatching eggs and day-old chicks should only be purchased under guarantee of blood-tested stock. *B.W.D.* is a *salmonellosis* (*see below*), being caused by *S. pullorum*. Treatment of affected chicks with antibiotics and other drugs will reduce losses and allow rearing of chicks, but, owing to the spread of infection from carriers, it should be adopted with caution, the treated birds being isolated from breeding stock and kept only long enough to prepare them for the table. *Bumble Foot* is a swelling of the ball of the foot caused by repeated bruising through jumping off perches which are too high, or by hard, stony ground or wounds caused by thorns, etc. It can also occur in cases of tuberculosis. Slight cases may be poulticed, but surgical interference is necessary in most cases. *C.R.D.* (Chronic Respiratory Disease) has assumed considerable importance with the development of intensive methods of poultry keeping. The exact nature of the organisms responsible is still somewhat in doubt. Treatment with certain drugs, such as the antibiotics, is said to be promising. (*See also* ROUP.) *Coccidiosis* is a type of disease caused by small protozoal parasites, somewhat similar to the malaria organism. Caecal coccidiosis attacks young chicks, causing a blood-stained diarrhoea. Duodenal coccidiosis attacks older fowls and has assumed importance of recent years in connection with the 'deep litter' and other intensive methods of husbandry. Recovered birds develop a resistance to further disease, and treatment with drugs, added to the mash or drinking-water, to stimulate the development of this resistance is now practised with success in what was formerly a very fatal malady. *Depluming Mite*, or scabies, is a

feather-eating mite mostly affecting the rump and head parts. The feathers are brittle, and the feather web has the appearance of having been nibbled away. Treatment is by modern insecticides and disinfection of houses. *Egg-binding* can often be relieved by keeping the bird in a warm place or holding it over steam from boiling water for a short while to relax the parts. Neglect may result in peritonitis. *Feather eating*, an objectionable habit difficult to cure, may be associated with the presence of body parasites. *Fowl Cholera* can infect all kinds of birds. It is characterised by a stinking diarrhoea, green in colour and watery in consistency. 'Carrier' birds transmit infection through their droppings, which contaminate drinking-water and food. Preventive vaccination is of limited use, but antibiotic treatment is not without promise. *Fowl Pest*, *Newcastle Disease*, is a virus disease which spreads with great rapidity and in which the symptoms vary considerably, from an acute form with marked lassitude and discharges from eyes and mouth to a mild infection in which a sudden drop in the egg yield may be the only sign. Positive diagnosis is by a complicated laboratory test carried out at the Ministry of Agriculture Veterinary Laboratory. The disease is notifiable to the police, and all birds on infected premises are slaughtered and compensation paid to owners. Attempted treatment is illegal in Great Britain, but preventive vaccination is practised in some countries where the disease is endemic. *Fowl Plague* is closely related to, but not identical with, *Newcastle Disease*. *Fowl Pox*, *see* ROUP. *Fowl Typhoid* is an infectious disease most prevalent in Wales and neighbouring Eng. cos. and in certain is. in Scotland, and is generally found on premises where the standard of hygiene is not high. Its symptoms may resemble those of fowl cholera. It is caused by *Salmonella gallinarum*, and infected birds react to the blood test for *B.W.D.* Treatment as in the case of *B.W.D.* may be adopted. *Gapes* is caused by the presence of worms in the wind-pipe, and is commonest in young chicks up to 2 months of age, but also occurs in turkeys, pheasants, and wild birds. The worms may be removed on a feather rotated in the wind-pipe or by placing the chicks in air pregated with an antimony salt. Gape worm is transmitted by earth-worms, snails, etc., which abound on badly drained land previously used by infected adult stock. *Paralysis*, fowl or avian, is a leukaemic disease caused by a virus which attacks young chicks in the early stages of life, but which is not obvious until the birds reach, or are near to, maturity. There is no treatment. Prevention is by breeding from resistant strains and rearing young chicks in strict isolation on ground which has been free of adult stock for at least one year. *Roup* (q.v.) is a common contagious catarrhal disease of fowls. Diseases caused by germs of the *Salmonella* group may be the cause of severe losses (*see B.W.D. and Fowl Typhoid above*). The particular

species or strain of the causal organism can be differentiated only by complex laboratory methods. Germs, which are excreted by carrier birds and, in the case of some species, by rats and mice, may be present in, or on shells of, eggs. Infection by *Salmonella* organisms may result in a high death rate in ducklings and turkey poults as well as chicks. Some species of *Salmonella* are pathogenic to man, and cases of food poisoning in human beings have been caused by eating infected ducks' eggs. *Scaly Leg* is caused by mange mites under the scales of the legs. Scrubbing the legs with a solution of a modern parasiticide, or even paraffin lamp oil, together with disinfection of houses, will bring about recovery. *Tuberculosis*, 'going light,' or 'spotted livers,' caused by the avian variety of the tubercle bacillus, is fairly common in fowls on those premises where they are retained for sev. years, as opposed to those specialised poultry farms where only young birds are kept for egg production and then slaughtered for the table after the first or second laying season. The disease mainly attacks the digestive system in birds, and is well advanced before the bird appears obviously ill. Lameness, often with swollen joints, is common in infected flocks, and may be mistakenly considered as due to rheumatism. Although affected birds may waste, the disease is common in fat old boiling fowls, which may show no signs of illness, except perhaps yellow-capped stools, which are common when the liver is affected, as it almost invariably is. The infection can be detected by means of the tuberculin test applied to the wattle, and tuberculin testing with slaughter of reactors, as in the case of cattle, is the only certain means of eradicating the infection from a flock. *Vent Gleet* is an infection of the vent characterised by discharges. Infection is usually spread by the male bird and by affected hens soiling nesting-boxes. *White Comb*, *Favus*, is due to a fungus similar to ringworm growing on the comb. It may be transmitted from infected mice, but rats are not susceptible. Spots form on the comb and may emit a mouldy odour. Sulphur ointment and ringworm dressings are used in treatment, but care should be taken in handling affected birds, as the disease may be contracted by human beings.

Turkeys. Blackhead or Infectious Entero-hepatitis is a very common cause of mortality in poults at the time when they are 'shooting the red' or developing the red parts of the head. The infection is due to a protozoan parasite which is carried by the larvae of the common caecal worm. Hence steps taken to deal with this worm are a measure of prevention. Signs are lassitude and yellow diarrhoea. Although the unfeathered parts of the head may become discoloured, blackening, despite the name, is by no means common. Fowls and other birds may harbour the infection without obvious signs, and may therefore be a means of infecting turkey poults. The use of

hens to incubate and rear turkey chicks is, therefore, not free from danger. Intensive rearing of turkeys on wire-netting floors is adopted to avoid infection. Treatment formerly by arsenical preparations has now been replaced by other and more effective drugs. *Erysipelothrix Infection* in turkeys yields to antibiotics, as does infectious sinusitis. Treatment in the latter disease is most successful when the antibiotic is injected directly into the sinuses of the head.

Table Poultry. For this purpose white-skinned, big-breasted, quick-maturing birds are essential. At 6 months such birds are placed in a small pen and fed for 2 or 3 weeks from a trough containing a mixture of balancer meal, ample fat scraps, and potatoes. They are starved for 24 hrs before killing. Cockerels not required for breeding purposes are reserved for the table. Hens culled (i.e. thrown out) because their laying days are over are sold as boiling fowls. The production of small roasting fowls at about 12 weeks old has recently spread from America. This is known as broiler production—an unfortunate choice of name which erroneously suggests that the poultry are for boiling.

Killing and Plucking. In the case of chicks the bird is placed with its neck against the edge of a table or door; pressure by thumb-nail on the other side will sever the neckbone and cause instantaneous death. Cockerels and hens are taken by the legs, hanging head down, and gripped behind the head (back of head to palm of hand) with first and second fingers. The head is bent back firmly to part the neckbone just below the head and the bird plucked directly after killing. If the plucking be delayed the bird should be plunged into hot water, when the feathers will come away more easily.

Auto-sexing. Experiments undertaken at research stations have enabled the sex to be determined by the plumage of the bird in the case of the Welbar, Legbar, Cambar, etc. (see also SEX DETERMINATION).

DUCKS. Of the many breeds of duck (q.v.) the two which are most popular with domestic keepers are the Aylesbury, unsurpassed for table purposes, and Khaki Campbells, which are excellent layers and also good table birds. Ducks are hardy and can be kept profitably without a pond. If a duck-pond is constructed the sides should slope easily down to the water, the water being changed frequently. In a well-ventilated shed, with the floor well covered with straw in which the birds may lay their eggs, the ducks will lay almost daily.

GEESSE. These are not popular with the domestic poultry keeper, largely because the goose is not a satisfactory 'sitter,' and then only 4 or 5 goose eggs can be hatched under one hen; goose meat, because of its richness, is not liked by many, and a good area of grassland is needed to keep geese in good condition. The well-known breeds are Embden,

Toulouse, and Roman; a cross between the Embden and Toulouse makes the best table bird (*see also* GOOSE).

TURKEYS. These are really farm birds, and as such are not generally suited to the domestic poultry keeper (*see under* TURKEY).

GUINEA-FOWL. Guinea-fowl (q.v.) are popular both for their eggs and flesh, but they do not thrive in close confinement, and require a large range if they are to remain healthy. As a result, domestic poultry keepers do not often keep them.

See E. T. Brown, *The Poultry-keeper's Text-book*, 1948; C. E. Lee, *Profitable Poultry Management*, 1948; 'Poultry World', *Practical Poultry Keeping*, 1948, *Geese*, 1948, and *Ducks*, 1949; G. R. Scott, *Secrets of Successful Poultry-keeping*, 1948; and H.M.S.O., *Scientific Principles of Poultry Feeding*, 1950.

Pound, Sir (Alfred) Dudley (Pickman Rogers) (1877-1943), Brit. adm. He entered the *Britannia*, 1891; midshipman, 1893; sub-lieutenant, 1896; lieutenant, 1898. In 1899 he specialised in torpedoes, all his sea-time as a torpedo lieutenant being passed in flagships. On his promotion to cap. in Dec. 1914 he was appointed naval assistant to the First Sea Lord (Adm. Fisher). In Oct. 1915, as cap., he took command of the flagship *Colossus*, the leader of the 5th Div. of the battle fleet in the battle of Jutland. From 1917 to 1919 he was director of operations (home) at the Admiralty, and from May 1925 to Jan. 1927 he was chief of staff to Adm. Sir Rorer Keyes, commander-in-chief Mediterranean, being promoted rear-adm. during that period. In 1927 he was made assistant chief of the naval staff, with a seat on the Board of Admiralty. Two years later he hoisted his flag on the *Hood* in command of the battle-cruiser squadron, being made vice-adm. during the period of his command. From 1932 to 1935 he was Second Sea Lord and chief of naval personnel at the Admiralty. Acted as Chief of Staff to Adm. Sir Wm Fisher (q.v.), commander-in-chief Mediterranean, during the Abyssinian crisis, before succeeding him as commander-in-chief. From June 1939 until his death he was First Sea Lord and chief of the naval staff. His outstanding services were recognised by the award of the O.M. in Sept. 1943.

Pound, Ezra Loomis (1885-), Amer. poet and scholar, b. Hallowell, Idaho. He was educ. at Pennsylvania Univ. and settled in Europe in 1907, travelling widely in England, Italy, and France. P. was one of the founders of the Imagist school of poetry, and probably not only the greatest of them, but also the most scholarly. His knowledge of medieval literature is profound. His early books — *Excursions*, 1909, *Personae*, 1910, and *Lustra*, 1916 — show the results of his studies. Not only does he give in free verse lovely rhythmic inventions of his own, but also masterly trans. from the Provençal songs of the troubadours. He trans. many works of the Chinese, Lat., It., and Fr. poets. Some of his own

poems are hauntingly beautiful, and full of experiments, while at other times he is a savage satirist. Among his prose writings are *Indiscretions*, 1923, and *Imaginary Letters*, 1930. P. broadcast from Italy during the Second World War, and was later accused of treason by the U.S. Gov. In 1946 he was declared mentally unsound and was confined in an asylum. In 1948 he was awarded the Bollingen prize for his *Pisan Cantos*, written while he was in the asylum. While there he also trans. the odes of Confucius. *See* T. S. Elliot, *Ezra Pound, His Metric and Poetry*, 1917; A. S. Amdur, *The Poetry of Ezra Pound*, 1937; and H. Kenner, *The Poetry of Ezra Pound*, 1951.

Pound, weight, see METROLOGY.
Pound, enclosure in which cattle or other beasts are confined when taken trespassing or going at large contrary to the law. See pound breach under BREACH.

Poundal, in dynamics, unit of force in the foot-pound-second system, is that force which, if acting for 1 sec., will produce in 1 lb. a change of velocity of 1 ft per sec. in the direction of the force. *See* KINETICS; DYNE; METROLOGY.

Pounds, John (1760-1839), philanthropist, b. Portsmouth. Being crippled for life by an accident in 1781, he became a shoemaker and set up business for himself in 1803. In 1818 he began to teach poor children, and from that time became famous as a teacher and friend of the poorest, being the originator of ragged schools (q.v.). After his death schools were estab. as memorials to him.

Poussin, Nicolas (1594-1665), Fr. painter, b. Les Andelys, Normandy. He studied under Quentin Varin of Amiens and Ferdinand Elle, a Fleming, and in 1624 settled in Rome, where he studied the works of Raphael and of classical antiquity, spending his life there except for a stay in Paris, 1641-2. He excelled as a painter of hist. and landscapes. The noble construction of his designs may be well appreciated in engravings, but his colour at its best has a restrained beauty. A famous masterpiece is 'The Arcadian Shepherds' (Louvre).

Pout, see BIR.

Powan, see COREGONUS.

Powder Metallurgy, see METALLURGY.
Powell, Cecil Frank (1903-), physicist, b. Tonbridge, studied at Cambridge. Prof. at Bristol since 1948. Worked with A. M. Tyndall at Bristol from 1928 on the mobility of gaseous ions. In 1938 he began to study the properties of photographic emulsions as detectors of charged nuclear particles. With the aid of improved emulsions he discovered the p-meson, in collaboration with Occhialini and Lattes, 1947, for which he was awarded the Nobel prize in 1950. The nuclear emulsion technique is now an estab. precision method in nuclear and cosmic-ray physics.

Power. A P. is an authority reserved by or limited (*see* LIMITATION) to a person to dispose, either wholly or partially, of real or personal property either for his own benefit or for that of others. The

word thus specialised is highly technical, and the idea underlying it must not be confused with the dominion exercisable by a man over his own property by virtue of ownership. Usage has sanctioned a classification of P.s into: (1) Common law P.s, i.e. either bare authorities by one person to another to do an act for him or P.s coupled with an interest. Examples: A P. of attorney (q.v.); a declaration in a will by a testator that the executors may sell the land, by virtue of which P. the executors can pass the legal estate to the purchaser. (2) Equitable P.s, or those which affect the equitable as opposed to the legal interest or estate in property (see EQUITY); the commonest example is the ordinary P. of appointment among children in a marriage settlement (see LAND LAWS), where personality (see PERSONAL PROPERTY) is vested in trustees. A 'general P. of appointment' is one whereby the donee of the P. can appoint whom he will as owner of a particular fund or other property; a 'special P.' is one whereby he can only appoint some or all of a specified class of persons (usually children or other issue to be provided for in a marriage settlement). (3) P.s operating under the Statute of Uses, or P.s of revoking (or declaring future) uses vested in some person named for that purpose in the deed by which the uses to be affected by the operation of the P. are created. The commonest instances of the exercise of this cumbersome device for getting over the technical difficulties of common-law conveyancing rules are the P.s of sale and jointuring (see JOINTURE) in a marriage settlement.

Power, rate of work done or energy expended per unit time. Units used are (1) horse-power, h.p., defined by Watt as that developed on lifting 33,000 lb. 1 ft. per min., and (2) watt, W., the power developed by a current of 1 ampere in a wire, the voltage between the ends of which is 1 volt. The unit of energy is 1 joule, J, and $1 \text{ J} = 1 \text{ Ws} = 1 \text{ VAs}$. The relation between the units of power is 1 h.p. = 33,000 lb. ft./min. = 550 lb. ft./sec. = 746 W. Multiples of watt are 1 kW = 1000 W, 1 MW (megawatt) = 10^6 W , 1 TW (terawatt) = 10^{12} W . The usual way of expressing electrical energy is in kWh = $1000 \times 3600 \text{ Ws} = 3.6 \times 10^6 \text{ J}$, or, in stating annual consumption, in TWh = $3.6 \times 10^{12} \text{ J}$. See also HORSE-POWER; ELECTRICITY; METROLOGY.

Power Factor. If $E \sin \omega t$ is the voltage across a circuit, the current being $I \sin (\omega t - \phi)$, lagging by the angle ϕ , the instantaneous power is $EI \sin \omega t \sin (\omega t - \phi) = \frac{1}{2}EI(\cos \phi - \cos(2\omega t - \phi))$. Over one cycle, the value of $\cos(2\omega t - \phi)$ is as much positive as negative, and the sum of all the values = 0. The effective power is therefore $\frac{1}{2}EI \cos \phi = \frac{E}{\sqrt{2}} \cdot \frac{I}{\sqrt{2}}$

$\cos \phi = \frac{P}{VA} \cos \phi$, where V and A are the root mean square values. The factor $\cos \phi$ is the power factor. If voltage and current are not sine waves, the power factor is defined as the power (in watts, as shown on a wattmeter) divided by the

volts \times amperes. In a circuit of resistance R and reactance X , $\cos \phi = \frac{R}{\sqrt{R^2 + X^2}}$.

See ALTERNATING CURRENT.

Power-factor Improvement, see PHASE ADVANCES.

Power of Attorney, authority by one person, called the donor, to another, called the donee, under which the latter becomes authorised to act as the agent of the former. It is by no means essential that a P. of A. should be given by any formal instrument, but in practice the authority is always embodied in a deed poll of indenture. Where the authorisation is to act for the donor in all matters, or in all matters relating to a particular business, it is called a *general P. of A.*; where the donee is authorised only to do some specified act the P. of A. is called a *special power*. P.s of A. are construed strictly, and give only such authority as is conferred expressly, or is by implication clearly necessary for the due execution of the powers expressly conferred. The stamp duty on a P. of A. to a person to vote as proxy is 1d.; on a P. of A. for any purpose not specifically described in the Stamp Act, 1891, 10s.; but proxies given by creditors or contributories in bankruptcy and winding-up proceedings are exempt.

Power Stations generating electric power in modern interconnected systems are located rather with consideration of the prime movers than, as in the early days, at centres of gravity of consumption. Water-power stations (see HYDRO-ELECTRIC POWER) are naturally where the falls can best be exploited and reservoirs and dams built, but the best placing can be decided only after detailed study of topographical, hydrological, and geological conditions. Careful planning makes for quick realisation. Increased cost of labour and materials for building of conduits from reservoir intake to the power house and progress in tunnelling technique favour construction of underground stations where the rock is suitable. Steam P. S. require easy access to water and facilities for transport, delivery, and storage of fuel. Where natural gas is used, as in Italy, the station is near the well. In nuclear P. S., which use uranium in a reactor (q.v.) instead of coal or oil in a furnace, the amount of fuel is small, about 25 tons per annum for a 100-MW station, but the size of a station is many times greater than that of a conventional steam station of the same power. The large pressure vessels must be assembled (of 2-in. steel plate) on the site, and the civil-engineering structures require a large labour force (2000 at Calder Hall). A further problem at present is the disposal of waste material, which, being radioactive, cannot be dumped in the sea or a river, nor simply buried in the soil.

Large P. S. are either steam- or water-power stations. Diesel engines are sometimes used as prime movers, especially in countries lacking indigenous fuel or in P. S. which are complements to water-

power stations in networks. They have no boiler plant and take up less space than steam-stations. They are quick-starting and can be operated automatically. In conventional steam stations the furnace and boiler plant follows the usual design (see *Boiler*), but full use is made of electric power for driving pumps, fans, conveyors and stokers, and the operation is supervised and controlled from the central control room. In a nuclear power station the heat developed in the reactor cannot be transferred direct to a boiler. Carbon dioxide under high pressure (100 lb. per sq. in.) absorbs heat from the reactor and passes into a heat exchanger, in which steam is generated in a coil of stainless-steel tubing. After giving up its heat, the gas returns to the reactor vessel for renewed heat absorption. Calder Hall has 4 heat exchangers with a total length of steel tubing of 500,000 ft.

The prime mover and generator form the core of the power station, and the prime mover determines the type of generator. Water turbines are mostly of the reaction type, except for high falls, with vertical axis and large diameter (5-10 metres) running at 3-400 revs. per min. A 3-phase, 50-c/s alternator must then have 16-24 poles (see *ELECTRIC MACHINES*). Steam turbines (see *TURBINES, STEAM*) run at 1000-3000 revs. per min., and the alternator has 2-6 poles, of small diameter and great axial length. The exciter, a shunt-wound d.c. generator, is usually coupled on the main shaft. The alternator voltage is of the order of 10 kV, the modern tendency is towards high powers, up to 200 MVA. The layout of the whole plant differs from one station to another, but generally the alternators are connected through circuit-breakers each to its own transformer stepping-up the voltage to that of the transmission lines, the transformers being connected to the high-voltage busbar from which the lines go out. Where more lines are connected to the same busbar, the latter is often sectionalised, the sections being linked through reactors which prevent a short-circuit in one line being fed from another line, while not impeding the small balancing current which keeps the voltage uniform at normal load variations. The generators are protected by over-current and over-voltage relays which open circuit-breakers isolating the machine in case of fault. Voltage and frequency are controlled, and the operation of the plant is supervised and controlled from the control room. At Calder Hall there are in all 65 m. of cable from the control room to the reactor instruments and operating points.

Supply to auxiliary machines, and to heating, lighting, and ventilation installations may be obtained through a transformer from a special busbar connected direct to the alternator terminals. A reserve diesel unit is sometimes provided, started automatically if the generator fails. Emergency lighting and supply to signal and regulation apparatus is obtained from an accumulator battery.

Private P. S. in department stores, hospitals, and country houses are usually diesel-driven d.c. generators combined with an accumulator battery. The working may be automatic: the battery supplies the lighter load; when the load current reaches a certain value, the diesel starts automatically and continues running until the load decreases below the critical value.

Mobile P. S. for use on building sites are generator sets driven by internal-combustion engines, mounted on a truck.

At present, the capital cost of a 100-MW coal-fired power station is about £54.3/kW, that of a nuclear power station is reckoned at £123/kW, of which the reactor represents 40 per cent and the mechanical plant 42 per cent.

Powicke, Sir Frederick Maurice (1879-), historian, b. Alnwick, and educ. at Owens College, Manchester, and at Balliol College, Oxford. He was a fellow of Merton College from 1908 to 1915, and was made an honorary fellow of Merton in 1922 and of Balliol in 1939. After holding chairs of hist. at Queen's College, Belfast, and at Manchester Univ. he was regius prof. of modern hist. at Oxford from 1928 to 1947. In 1946 he was knighted. A brilliant medievalist, P.'s influence at Oxford did much to maintain and increase the keen interest in medieval hist. for which that univ. is famous. He stressed the importance of spiritual values in hist., and, while encouraging the new emphasis on economic factors, helped to ensure that they did not, at Oxford, flourish to the exclusion of the spiritual. His *Henry III and the Lord Edward*, 1947, was an outstanding monumental study of a period of Eng. hist. which had not previously been thoroughly explored in England. Among his other pubs. are *The Loss of Normandy*, 1913; *Alfred of Rievaulx*, 1922; *Stephen Langton*, 1928; *Christian Life in the Middle Ages*, 1935; *The Reformation in England*, 1941; and *The Thirteenth Century* (Oxford History of England series), 1953.

Powis, Earls and Marquesses of, descended from the 1st earl (second 'Herbert' creation) of Pembroke, whose son Sir Edward Herbert in 1587 purchased P. Castle, Welshpool, from Edward Grey. Sir Edward's son Wm became Baron P., 1629. Wm's grandson, 3rd baron, was made earl 1674, marquess 1687. His honours became extinct on the death of the 3rd marquess, 1747-8. A descendant of a younger brother of Sir Edward was made earl, 1748; his honours became extinct on the death, 1801, of his son, whose sister had married Edward, 2nd baron Clive (1754-1839)—who was in 1804 created earl of P., and whose son and successor took the surname Herbert. The 5th earl, Edward Robert Henry Herbert (b. 1889) succeeded his cousin in 1952.

Powys, John Cowper (1872-), poet, essayist, and novelist, b. Shirley, Derbyshire, son of a clerkymen, and brother of Llewelyn and Theodore P. (qq.v.). He was educ. at Sherborne and Cambridge.

His books of verse include *Wolfsbane Rhymes*, 1916, *Mandragora*, 1917, and *Samphire*, 1922. Of his novels the best are *Wolf Solent*, 1929, *A Glastonbury Romance*, 1932, and *Owen Glendower*, 1940. Among his books of essays are *The Meaning of Culture*, 1929, *In Defence of Sensuality*, 1930, *A Philosophy of Solitude*, 1933, *The Art of Happiness*, 1935, *The Pleasures of Literature*, 1938, and *The Art of Growing Old*, 1944. He also wrote studies of Dostoevsky, 1947, and Rabalais, 1948. His *Autobiography* appeared in 1934.

Powys, Llewelyn (1884-1939), essayist and novelist, b. Dorchester, Dorset, a brother of John C. and Theodore P. (qq.v.). Educ. at Sherborne and Cambridge, he lived in Kenya for health reasons from 1914 to 1919. His works include many sketches and stories from his years in Africa, including *Ebony and Ivory*, 1922, and *Black Laughter*, 1924. Vols. of essays are *The Cradle of God*, 1929, *Impassioned Clay*, 1931, *Glory of Life*, 1934, and *Dorset Essays*, 1936. *Apples be Ripe*, 1930, is a novel. *Confessions of Two Brothers*, 1916, was written in conjunction with J. C. Powys, and other biographical vols. are *Skin for Skin*, 1925, and *The Verdict of Bridle-goose*, 1926.

Powys, Theodore Francis (1875-1953), novelist, b. Shirley, Derbyshire, brother of John C. and Llewelyn P. (qq.v.). Educ. at Dorchester Grammar School, he lived a secluded life in Dorset, and told of it in *Soliloquies of a Hermit*, 1916. He wrote highly eccentric novels, of which *Mr Weston's Good Wine*, 1927, is considered the best. Others are *Black Bryony*, 1923, *Mark Only*, 1924, *Mr Tasker's Gods*, 1925, *Unclay*, 1931, *Captain Patch*, 1935, and *Goat Green*, 1937. *The Left Leg*, 1923, *The House with the Echo*, 1929, and *When Thou Wast Naked*, 1931, are vols. of short stories.

Poyning, Sir Edward (1459-1521), statesman, b. Southwark. He led the rising in Kent in support of Buckingham in 1483. When it failed, he fled to the Continent, but returned with Richmond, afterwards Henry VII, in 1485. He subsequently became lord-deputy of Ireland (1494). In this capacity he convoked a Parliament which passed 'Poyning's Law' (1494), enacting that no law could be valid in Ireland until it received the sanction of the Eng. king and council. This law was not repealed until 1782. P. defeated Perkin Warbeck and crushed the Yorkist cause in Ireland.

Poynter, Sir Edward John (1836-1919), painter, b. Paris. He studied art at Rome with Leighton, and in Paris under Gleyre, 1856-9. He was Slade prof. of art at Univ. College, London, 1871-6; became an R.A. in 1876; and director of the art dept at S. Kensington and prin. of the National Art Training Schools there, resigning in 1881. P. succeeded Burton as director of the National Gallery, 1894-1905 (he made the Tate Gallery a dept of it). He ed. the *Illustrated Catalogue of the National Gallery*, 1889-1900. From Millais's death (1896) he was president of the

Royal Academy. He was knighted in 1896 and created a baronet, 1902. He became a G.C.V.O. in 1918. P. designed the cartoons for the mosaic panels of 'St George' and 'St David' in Westminster Palace (1870), and of 'Appelles' and 'Phidias' in the Victoria and Albert Museum. His pictures include 'Israel in Egypt', 1867, 'Atalanta's Race', 1876, and 'A Visit to Aesculapius', 1880, in the Tate Gallery, an admirable work in the academic style. He pub. *Ten Lectures on Art*, 1879.

Poynting, John Henry (1852-1914), physicist, b. near Manchester. He was educ. at Owens College and Trinity College, Cambridge, and became prof. of physics at Birmingham in 1880; in 1888 he was elected F.R.S. Formulated P.'s theorem in 1884, proving that the flow of energy could be expressed in terms of the magnetic and electrical forces at a point. He determined the constant of gravitation by a torsion experiment in 1893, and showed that light pressure could exceed gravity for finely divided matter.

Požarevac (Ger. Passarowitz), tn in Serbia, Yugoslavia, 38 m. SE. of Belgrade. A peace treaty was signed here in 1718 between Austria and Venice on the one hand and the Turks on the other (see *TURKEY, History*). Pop. 18,550.

Poznań (Ger. Posen): 1. Prov. (*województwo*) of W. Poland. Before 1919 its ter. was divided between the Prussian prov. of Posen and Lower Silesia. It is a fertile low-lying region with many forests and lakes. Its chief rvs. are the Warta, the Odra, and the Noteć. The prov. is mainly agric., producing cereals, potatoes, and beet, and supporting cattle and pigs. There are textile, metal, wood, chemical, brewing, and glass industries. Area 10,522 sq. m. Pop. 2,100,000.

2. City of Poland, cap. of P. prov., on the Warta, 175 m. W. of Warsaw. In 968 it became the first Polish bishopric, and it was the chief seat of the early Polish dukes. In 1793 it became part of Prussia, but in 1807 was incorporated in the duchy of Warsaw. In 1815 it was returned to Prussia as the duchy of Posen. Since 1821 it has been the seat of the Archbishop of P. and Gniezno. There is an 18th-cent. cathedral (severely damaged in the Second World War), a notable palace, old houses, museums, and a univ. (1919). There are metallurgical, chemical, textile, engineering, tobacco, food and leather industries, and there is a large trade in agric. produce and timber. Hindenburg (q.v.) was b. here. Pop. 372,000.

Pozoblanco, Sp. tn in the prov. of Córdoba, in a lead-mining dist. It has cattle fairs, and a woolen industry. Pop. 22,000.

Pozsony, see BRATISLAVA.

Pozzuoli (anc. Puteoli), It. seaport in Campania (q.v.), on the Bay of Naples, 6 m. SW. of Naples (q.v.). It became a Rom. colony in the 2nd cent. BC. St Paul (q.v.) landed here in AD 61. The tn was sacked by the Saracens (10th cent.) and by the Turks (16th cent.), and was

devastated in earthquakes in 1198 and 1550. There are numerous Rom. remains, including an amphitheatre, a market, and a temple of Augustus, into which the cathedral is built. Behind the tn is the half-extinct volcano, Solfatara. There is an armaments factory. Pop. 41,850.

Practice, in arithmetic, name given to a rule or method which shortens the operation of compound multiplication; e.g. find the price of 85,764 articles at £3 15s. each:

£ 85,764 is the cost at £1	
∴ 257,292 " "	
42,882 " "	10s. ($\frac{1}{2}$ of £1)
21,441 " "	5s. ($\frac{1}{4}$ of 10s.)
∴ 321,615	3 15s.

Practice and Procedure (in law), see ACTION; CRIMINAL LAW; EVIDENCE; INJUNCTION; INTERLOCUTORY PROCEEDINGS; PLEADINGS; PROCESS (in law); PROOF; SPECIFIC PERFORMANCE; SUMMONS; WRIT.

Practitioner, see MEDICAL PRACTITIONER.

Prades, Fr. tn, cap. of an arron., in the dept. of Pyrénées-Orientales, on the Têt. It is known for its wines and honey. Pop. 5000.

Prado, Museo del, state gallery of Madrid. Though estab. only in 1819, by Ferdinand VII and Isabella of Braganza, it quickly became the repository of great works accumulated notably by Charles V, Philip II, and Philip IV and also by the religious houses of Spain: it has since ranked as one of the world's greatest art collections and indisputably the greatest collection of Sp. masters. There are over 60 paintings by Velázquez, and no other gallery has works by that master comparable with his 'Los Menifas' (Maids of Honour), 'The Tapestry Weavers,' 'The Surrender of Breda,' 'Los Borrachos' (The Topers), 'Aesop,' and other portraits. Murillo, with more than 40 paintings, is at his best. Goya, in portraits, his paintings for tapestry, his famous 'Maja,' his scenes of the French invasion in 1808, and his 'Bull-Fight,' is superb. El Greco, Zurbarán, and Ribera (with 58 pictures) are also splendidly represented. The attachment of the Hapsburgs to Venetian art is evidenced in the wealth of paintings by Titian (including his portrait of Charles V), Tintoretto, and Veronese. The Sp. connection with the Netherlands helps to account for the especial richness of the Flem. School representation: more than 50 Brueghels and over 60 works by Rubens; a fine 'Adoration of the Magi' by Memling, 'The Village Fête' by Teniers, hunting scenes by Franz Snyder and Paul de Vos, Van Dyck's 'Countess of Oxford.' In the P. also are masterpieces by the strange genius whom Philip II favoured, Jerome Bosch. There are pictures too by Raphael, Rembrandt, Poussin, Claude, Dürer, Holbein, and other masters.

Praed, Mrs Campbell, née Rosa Caroline Prior (1851-1935), Australian novelist, b.

Bromelton, Queensland. Educ. at Brisbane, she married A. C. B. Praed in 1872, and they made their home in England. Her novels include *An Australian Heroine*, 1880, *Policy and Passion*, 1881, *Nadine*, 1882, *Moloch*, 1883, *Zero*, 1884, *The Romance of a Station*, 1891, *December Roses*, 1893, *The Other Mrs Jacobs*, 1903, *Nyria*, 1904, and *Opal Fire*, 1910. In collaboration with Justin McCarthy (q.v.) she wrote *The Ladies' Gallery*, 1888, and *The Rival Princess*, 1890. *My Australian Girlhood*, 1902, tells of her early life.

Praed, Winthrop Mackworth (1802-39), poet, b. London, son of a lawyer. He was educ. at Eton, where he ed. a school magazine, and at Trinity College, Cambridge, where he twice won the Chancellor's Medal for Eng. verse. In 1829 he was called to the Bar, and shortly afterwards became an M.P. He lost his seat with the passing of the Reform Act, but sat subsequently for Yarmouth and then Aylesbury, and in 1835 was Secretary to the Board of Control in Peel's administration. A few years later he d. of consumption. Though P. wrote a considerable amount of serious poetry, he is remembered chiefly as the supreme master of society verse—elegant trifles wittily depicting men and women as they appear in the fashionable world. Well-known examples of this are 'Good-night to the Season' and 'Our Ball,' while 'The Vicar' shows his dexterity in what has been termed metrical *genre-painting*. See ed. of his poems, with memoir, by D. Coleridge, 1864.

Praefectus, an auct. Rom. title of authority. In republican times it was used by a cavalry commander, but was applied under the empire to an officer of equestrian rank who gradually superseded the senatorial *legatus* as commander of a legion. The P. *Praetorio* was originally commanding officer of the Praetorian Guard; but after the latter's abolition by Constantine the title was held by governors of the prin. divisions of the empire. The P. *Urbi* commanded the urban cohorts who were responsible for public order at Rome; the city fire-brigade was under a P. *Vigilum*. The P. *Annona* was responsible for the corn-supply.

Praemonstratensians, see PREMONSTRATENSIANS.

Praemunire, name of a medieval writ taking its title from the opening words *Praemunire facias* (cause to forewarn). The name came to be applied to the offences prosecuted by such a writ and to the penalties incurred. In this way the name P. came to be given to sev. Eng. laws passed in the later Middle Ages for the purpose of restricting papal authority in England. The first of these statutes of P. was passed in 1353, but that which is usually known as the statute of P. was a law passed in 1392, forbidding the obtaining of bulls from Rome. After the Reformation many further types of offence were made subject to the penalties of P., e.g. such penalties were attached to the Habeas Corpus Act of 1679.

Praeneste, see PALESTRINA.

Praesepe, beautiful star cluster, commonly known as the Beehive, in the constellation of Cancer. It is just visible to the naked eye, and a small telescope or a pair of binoculars will show the individual stars. Next to the Pleiades it is the most conspicuous of the star-clusters.

Præsidium Julium, see SANTAREM.

Præsoodymum, see DIDYMIUM.

Præste: 1. Amt in SE. Zealand, Denmark; it includes the is. of Meen, Bogo, and Nyord. Agriculture, dairy farming, and fishing are carried on. Area 654 sq. m.; pop. 122,920.

2. Small tn and port, cap. of the above, 43 m. SSW. of Copenhagen. Pop. 1570.

Prætor (*præ-itor*, one who goes before), originally a title designating the Rom. consul as leader of the Army (*Gk strategos*). After 366 BC it was applied to the annually elected curule magistrate, who administered justice and was subordinate to the consuls. The office was open to the plebeians by 337. By 246 there were 2 P.s (*urbanus* and *peregrinus*), the number later increasing to 18 under Nerva. There were 8, 16, and 12 under Sulla, Julius Caesar, and Augustus respectively. They were attended by lictors. Under the empire one of their chief functions was the management of the games. Many prov. governors were of praetorian rank. In later times the word came to mean mayor or chief magistrate, the It. *podestà*. See Labatut, *Histoire de la Préture*, 1868.

Praetorian Guard, or **Praetoriani**, imperial bodyguard in ancient Rome instituted by Augustus (2 BC), consisting of 9 (later 10) cohorts of about 1000 men each, horse and foot, commanded by a Prefect (see **PRAEFECTUS**). They had higher rank and pay than the legions, and their term of service was 16 years. They came to possess an almost acknowledged right to choose the new emperor. These cohorts, which were stationed in Rome, were collected into the famous 'praetorian camp' in Tiberius's reign. Constantine finally abolished them (AD 312). The name *praetoria cohors* had been applied earlier under the republic to select troops attendant on the praetor or general of the Army. See also **ROMAN ARMY**.

Prag, see **PRAGUE**.

Pragmatic Sanction (*Gk pragma*, business), solemn ordinance or imperial rescript. The term *pragmatica sanctio* was used in late Rom. law, and continued to be used in the legal phraseology of the Middle Ages and of modern Europe, particularly of a decree that defined the powers of a sovereign. The most important decrees in European hist. which have been so named are that of Bourges, in which Charles VII defined the Pope's power within the Fr. dominions (1437); of Charles VI of Germany, in which he settled his succession on Maria Theresa (1713); of Naples, when that kingdom was made over by Charles II of Spain to his third son (1759). The term P. S. has now only historical significance.

Pragmatism, or **Humanism**, is almost entirely a product of Amer. thought. It

was first clearly defined by Peirce, but only during later years did it become recognised as a distinct system of philosophy—a development due mainly to Prof. James (Harvard) and Dewey (Columbia). P. may be defined as the philosophy of the expedient; it refuses to recognise as ultimate the ordinary and accepted truths of metaphysics, and confines itself wholly to those truths which are definitely correlated to the actual facts of existence. Since the relation of such truths with facts is liable to constant growth and change, truth thus becomes an intellectual expedient just as right is a moral expedient. One must avoid the error, however, of regarding P. as a form of Positivism (q.v.) in spite of a superficial resemblance. P. contends that truth happens to an idea by force of circumstance, and that ideas are true only when they can be 'assimilated, validated, corroborated, and verified.' Thus the expression of truth is limited to broadly realistic lines, and the vague idealistic suggestions of certain schools of metaphysics are discarded as intrinsically false. See W. James, *Pragmatism*, 1907, and *The Meaning of Truth*, 1909; and Schiller's works on Humanism, 1903, 1907.

Prague (Czech *Praha*; Ger. *Prag*): 1. Region (kraj) in W. Central Czechoslovakia, part of the former prov. of Bohemia (q.v.). It is watered by the Labe (see **ELBE**), the Vltava (q.v.), and the Berounka. The S. half of the region is very mountainous. Area 3746 sq. m. Pop. 2,015,000.

2. Cap. city of Czechoslovakia, finely situated on both banks of the Vltava, almost in the geographical centre of Bohemia, of which it was formerly the cap. The site has been inhabited since prehistoric times. In the 10th cent. P. was a settlement protected by castles on the Hradčany hill on the l. b. of the riv., and the Vyšehrad hill on the r. b. St Wenceslas (q.v.) built a church where the cathedral now stands, and in 973 P. became a bishopric. Later there was an influx of Ger. settlers, and the tn grew steadily in importance. In the reign of the emperor Charles IV (q.v.) it consisted of 4 dists.: the areas of the 2 fort. hills, and the 'old' and 'new' tns. In this reign P. became an archbishopric. It suffered during the War of the Hussites (q.v.), and in 1620, during the Thirty Years' War (q.v.), the great battle of the White Mt was fought at its gates. It was taken by the Swedes (1648), the Fr. (1741), and the Prussians (1744 and 1866). In 1757 it was the scene of a Prussian victory during the Seven Years' War (q.v.). In 1848 a Pan-Slav congress was held in the city, and there was an unsuccessful revolutionary rising. It was occupied by the Germans in Mar. 1939 (see **BOHEMIA**), and was taken by Russian and a small number of Amer. troops, aided by Czech partisans, on 10 May, 1945. Heydrich (q.v.) was assassinated in a suburb of P. in 1942.

P. is a fine city, known for the richness and variety of its Gothic and Baroque buildings. The mainly-residential dists.

on the l. b. are overlooked by the celebrated royal castle (16th-17th cents.) on the Hradcany hill. Near the castle (now used by the gov.) is the Gothic cathedral of St Vitus (begun 1344), in the Wenceslas chapel of which the Kings of Bohemia were crowned. The main part of the city lies on the r. b. Here the anct fortifications have been replaced by parks, but the anct buildings and many of the picturesque streets of the 'old' and 'new' towns remain. Among the famous monuments of P. are: the Tfn (Hussite) church (14th and 15th cents.), which contains the tomb of Tycho Brahe (q.v.); the 14th-cent., towered, Charles bridge; the 14th-cent. Gothic synagogue; the 17th-cent. church of St Nicholas; and the 12th-cent. monastery of Mt Zion.

The Charles univ. (1348) of which John Huss (q.v.) was once rector, has over 20,000 students. There are also a technical univ. (1707), academies of art and commerce, scientific institutions, museums, and sev. libraries. Important as a riv. port, P. is also a centre of road and rail communications. It has very numerous industries, including engineering, iron-founding, brewing, and the manuf. of textiles, chemicals, and foodstuffs. Pop. 922,300.

See A. Exax and F. Hlavák, *Prag in Bildern*, 1928; O. Schuerer, *Prag, Kultur Kunst, Geschichte*, 1939; Karel Plicka, *City of Baroque and Gothic*, 1946.

Praha, see PRAGUE.

Praia (Porto Praia), cap. of the Cape Verde Is., on the S. coast of Santiago Is. It exports grain, coffee, and medicinal products. Cinchona is grown in the vicinity. Pop. 6000.

Prairie (month of meadows), ninth month of the year in Fr. revolutionary calendar. See CALENDAR.

Prairie (Lat. *pratium*, meadow), vast tract of land, usually level in character, covered with grass but devoid of trees, in temperate regions. Such areas of land are common in the U.S.A. and in the P. provs. of Canada. Some P.s are great wheat-growing areas: in other parts stock-raising is the chief occupation.

Prairie-dog, or **Prairie Marmot**, term applied to any of the 4 species of rodents in the squirrel family, Sciuridae, and genus *Cynomys*. They are burrowing animals, averaging about a foot in length, and have the curious habit of dwelling in friendship with the ground owl and rattlesnake. All are found exclusively in N. America.

Prairie-hen, or *Tympanuchus americanus*, galliform bird of the family Tetraonidae, to which belongs the grouse; the term is also applied to *Tetrao cupido*, a reddish-brown bird which is a near ally of *T. americanus*. Both species are natives of N. America.

Prairie State, see ILLINOIS.

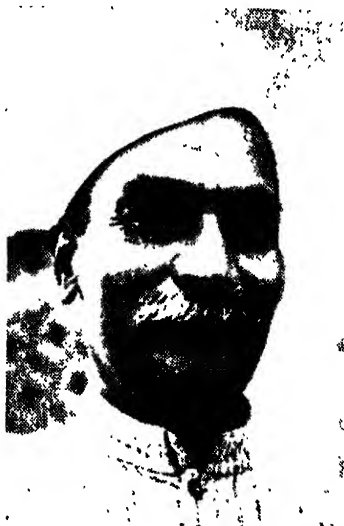
Prairie Wolf, see COYOTE.

Prakrits, Indian, see INDO-EUROPEAN LANGUAGES.

Prambanan, see BRAMBANAN.

Prasad, Rajendra (1884-), President of the Rep. of India. Indian nationalist

political leader, b. in a vil. in the Saran dist., Bihar. He became a member of the All-India Congress Committee in 1912, and practised law in the Patna high court in 1920. He gave up his practice and joined the non-co-operation movement, supporting Gandhi in the Champaran agrarian agitation. P. became a member of the working committee of the All-India Congress in 1922, and was president of the Congress, 1934. He was throughout his political career known and admired by Indians and British alike as a man of outstanding sincerity and integrity. At independence he was elected to preside over the Constituent Assembly, where his firm but tactful handling of most complicated and sometimes acrimonious debates gained him even greater respect. When Mr Rajagopalachari, India's last Governor-General, declined to stand for election as President, P. was elected without opposition (Jan. 1950), and re-elected in May 1952 and May 1957.



Indian Government

DR RAJENDRA PRASAD

Prase, leek-green chalcedony (q.v.), or quartz (q.v.) of the same colour. It is found in Saxony.

Praseodymium, metallic chemical element, symbol Pr, atomic weight 140.9, atomic number 59, discovered in 1885 by Auer von Welsbach. It belongs to the group of rare-earth metals and occurs in monazite and similar minerals. P. is a scarce element, and its compounds are difficult to purify. See RARE EARTHS.

Pratapgad, also **Partabgarh**, a hill fort on a precipitous rock, near Mahabaleshwar

(q.v.) in Bombay state, India, was a stronghold of the famous Mahratta Emperor Shivaji (1656).

Prater, see VIENNA.

Prato, It. tn, in Tuscany (q.v.), on the Bisenzio, 11 m. NW. of Florence (q.v.). Parts of its ancient ramparts remain, and it has a splendid 11th-15th-cent. cathedral, which contains frescoes by Filippo Lippi and Agnolo Gaddi, and reliefs by Andrea della Robbia (qq.v.); the external pulpit is partly the work of Donatello (q.v.). The beautiful church of Santa Maria delle Carceri has a dome designed by Giuliano Sangallo (q.v.). During the Second World War there was severe street fighting in P. between Ger. and Amer. troops in Sept. 1944, and much damage was done. The tn is an important centre of the cotton and woollen industries. Pop. 77,400. See M. R. Gabrielli, *Guida di Prato*, 1927.

Prati, Charles, see CAMDEN, EARL OF.

'Pravda' (Russian truth), Russian daily newspaper, central organ of the Communist Party of the Soviet Union (q.v.). It has been pub. since 1912, except for the years 1914-17, when it was suppressed by war-time censorship because of its defeatist policy (see LENTIN). Among its chief editors have been Stalin, Bukharin, and Shepilov. The editorials of P. generally serve in the Soviet Union as a guide to overt behaviour, and its editorial policy must be followed by the rest of the press, though since the post-Stalin 'thaw' some newspapers and journals have shown a modicum of independence. Present circulation 5 million.

Prawn, term applied to the shrimp-like decapod crustaceans in the family Palaemonidae, but especially to *Palaemon* (or *Leander*) *serratus*, which furnishes the edible P. It is from 3 to 4 in. long, has a long, serrate rostrum, of a pale red colour, and is often found near rocks on Brit. shores. In America the name is applied to sev. shell-fish, but in particular to *Pemaeus esculentus* and *P. brasiliensis*. See CRUSTACEA.

Praxiteles (fl. c. 364-330 BC), Athenian sculptor. His chief works have perished, including the 'Aphrodite' of Cnidus (for which Phryne was probably his model). This was ranked in antiquity next to the 'Zeus' of Phidias at Elia. It was destroyed by fire in AD 475, but a copy exists in the Vatican. Other works were a 'Batyra', 'Eros of Theophaea', and 'Apollo Sauroctonos'. His 'Hermes', a most important monument of 4th-cent. art was found in the Heraeum at Olympia (1877). In this a great and distinctive genius is seen which enables us to call many works of the period 'Praxitelean' in their easy grace. The Basis from Mantinea, representing the contest of Apollo and Marsyas, is also ascribed to him. See Pliny, *Hist. Nat.*, xxxiv and xxvii; A. Furtwängler, *Masterpieces of Greek Sculpture* (Sellers's trans.), 1895; W. Klein, *Praxiteles*, 1898; and study in *Plo Arte* by K. Schefold, 1945.

Prayer (Lat. *precari*, to implore, entreat), in the deepest sense of the word, signifies the lifting up of the mind and

heart to God. In a secondary sense it is also used of converse with and petition addressed to lesser beings, such as the saints, the departed, and even the temporal sovereign ('prayers' to whom are a familiar parl. process). P., however, is a term generally used in the specific sense of communion with God; as such it is essentially an act of religion (q.v.) and is found wherever there is a belief in a personal divinity or divinities. P. in primitive religions is devoted almost entirely to the securing of material benefits, such as health, good crops, or success in war. In higher religions, however, P. includes not only petitions but also acts of adoration, love, thanksgiving, and atonement. Jesus Christ emphasised the essentially spiritual nature of P., and gave the 'Our Father' as a model. P. may be classified as public or private, oral or mental. Christian public P. includes the liturgy (Mass and divine office) and other forms of service. Private P. may be oral or mental. Oral P. is expressed in words and demands at least a minimum of attention and intention if it is to be real, though it can become a means or an accompaniment to a higher form, viz. mental P. The latter includes 3 degrees corresponding to what theologians describe as 'purgative', 'illuminative' and 'unitive' stages of the spiritual life. The first of these degrees, (1) *meditation*, is characteristic of the purgative stage. It is not the mere indulgence of a natural disposition to reverie, but involves a deliberate act of attention; and the fact that it normally leads to active silent P. followed by a practical resolution distinguishes it from the *dhyāna* of the Buddhists and the *dikhr* of the Sufis. The illuminative stage is characterised by (2) P. of *quiet*, in which the whole soul rests in active contemplation of God. Between these two, and overlapping with both of them, is *affective* P., in which the preparatory work of the intellect is reduced to a minimum. The third or 'unitive' stage is characterised by (3) *passive or mystical contemplation*, wherein infused knowledge takes the place of ratiocination. See (Rom. Catholic authors) the works of St John of the Cross and St Teresa of Avila (qq.v.); S. F. Poulain, *Grâces d'Oraison*, 1906; P. Boylan, *Difficulties in Mental Prayer*, 1945; and (Protestant authors) B. Frost, *The Art of Mental Prayer*, 1939; L. D. Weathered, *Healing Through Prayer*, 1946.

Prayer, Book of Common, authorised service book of the Church of England. The B. of C. P. and administration of the Sacraments, and other rites and ceremonies of the Church, according to the use of the Church of England, is adequately described in its title. The purpose of its compilation is clearly explained in the preliminary dissertation 'Concerning the Service of the Church' which first appeared in the book of 1549, and which has remained at the head of the P. Book ever since that date. The preface gives the following reasons why a new B. of C. P. was required: (1) that the Lections

and Psalms might be better arranged, that the number of feast days might be reduced, and that legendary matter might be removed; (2) that English might be substituted for Latin; (3) that one uniform use might be set up instead of the variety of uses that had before obtained. Before the Reformation there was no rigid uniformity in the Catholic liturgical books. Printing was not in use, and different reforms were made along different lines in various parts of the country. There was always, however, a distinct trend in the direction of uniformity; and in time, as certain cathedral churches and monastic houses rose into greater prominence, they began to be copied in the dioceses all round them. The P. Book speaks of the uses of Salisbury, Hereford, Bangor, York, and Lincoln, but it is important to remember that the first of these was more important and widespread than all the others put together. It formed, ostensibly, the basis of the English P. Book. Successive stages in the progress of revision, as the Reformation went on, may be given shortly as follows, in order of date: 1544, a Litany in Eng. pub.; 1548, 'The Order of the Communion' pub., an Eng. form for the administration of Communion in both kinds to be inserted in the Lat. service; 1549, the first P. Book of Edward VI, containing the order for Morning and Evening Prayer, etc., on the plan of the present P. Book; 1552, the second P. Book of Edward VI was issued but only remained in use for about 8 months. On the accession of Mary the Catholic liturgy was restored. In 1559, the year after the accession of Elizabeth, a revised P. Book was issued, modifying some of the statements of the 1552 book in favour of a more Catholic interpretation. The 1552 book had been compiled while the influence of the foreign reformers was most strong, and it was this version which came closest to the ideas of continental Protestantism. Elizabeth's P. Book was, in all essentials, the P. Book as it exists today. The preface proclaimed that the policy of the Church of England was 'to keep the mean between the two extremes.' It seems certain that the moderation of the Elizabethan B. of C. P., with its deliberate ambiguity on certain fundamental issues, ultimately endangered the Elizabethan settlement, and has led to there being, almost continuously from 1559, 2 opposing sections in the Church of England, each arguing its own interpretation of the disputed passages. The Elizabethan compromise was never universally accepted. The ornaments rubric was resented from the first. The Puritans could only with difficulty be made to use the surplice. They became increasingly hostile, and the hist. of Elizabeth's reign is, to a considerable degree, the hist. of a relentless conflict between Puritanism and churchmanship, with the Prayer Book as the chief battleground. As a result the Prayer Book became one of the issues over which the Civil war was fought. In 1645 it was suppressed by Parliament, and its

use was made a penal offence. In 1660, however, it was restored, and at a last revision some 600 minor alterations were made, including the addition of the last part of the Catechism, dealing with the Sacraments, the separation of the Catechism from the Confirmation service, the use of the word 'priest' rather than 'minister' in sev. places, and the addition of 'the commemoration of the departed' in the Prayer for the Church Militant. But it was still the book of 1552 rather than that of 1549.

After the beginning of the 20th cent. agitation to revise the B. of C. P. received an impetus due mostly to the conviction that the social and mental development of the civilised world had created a need for a Prayer Book that should be more closely in touch with the people, and which would be able more intimately to enter into their ordinary lives. The agitation was not confined to any particular country, but arose in England, Scotland, Ireland, America, S. Africa, and Canada. The bitter arguments between High and Low Church parties in the preceding century had also suggested that sev. disputed sections of the B. of C. P. should be more clearly defined. In England deliberations took place by a specially appointed convocation between 1906 and 1920, and final proposals drawn up by the Church Assembly were considered by the Houses of Clergy and Laity. They were handed to the bishops for final revision. In 1927 the proposed alterations were placed before Convocation. They included alternative orders for the Holy Communion, Public Baptism, Confirmation, and the Solemnisation of Matrimony. The Ordinal of 1662 was revised, and many occasional prayers were added, while portions of the Psalms were allowed to be omitted. The revision was, in fact, a move much nearer the B. of C. P. of 1549. Most support came from the Anglo-Catholics, and the book was passed by the House of Lords. But the House of Commons definitely rejected it, and the bishops drew up an amended list of changes, thereby alienating many former supporters among the Anglo-Catholics. But the Church Assembly approved the amended ed., and it was once more brought before Parliament, only to be rejected again. Since then the use of many passages in the rejected version has been sanctioned by some bishops. Special services in commemoration of the fourth centenary of the first Eng. Prayer Book were held in 1919. Although there are divs. of opinions even among Anglicans on some of the liturgical aspects of the B. of C. P. in its present form, it is universally agreed that the beauty of its language is outstanding, and has exercised an incalculable influence upon Eng. thought and writing during the past 4 centuries, far beyond the confines of Anglicanism (q.v.). See F. Procter and W. H. Frere, *New History of the Book of Common Prayer*, 1901, and *Report of Convocation*, 1927; C. S. Phillips, *The Background of the Prayer Book*, 1938;

M. M. Knappen, *Tudor Puritanism*, 1939, W. K. Lowther Clarke, *The Prayerbook of 1528 Reconsidered*, 1943.

Praying Mantle, see MANTIS.

Preaching Friars, see DOMINIC, St.

Prebend, term formerly denoting the food, clothing, etc., of a secular priest or canon regular, or the endowment from which this was provided, as distinct from the income of a benefice. Later it was applied to the endowment possessed by a cathedral or collegiate church for the support of a canon residentiary, who was in consequence known as a prebendary. To-day the P. is generally an honorary office, and the prebendary is then not a member of the cathedral chapter, and does not receive a stipend.

Pre-Cambrian, geological name for the period which elapsed between the start of geological time, i.e. the cooling of the earth, and the Cambrian (q.v.). The P. is believed at the present day to have extended from 3,500,000,000 to 500,000,000 years ago, and thus to have occupied a period of 3,000,000,000 years, or six-sevenths of all geological time. Virtually no fossil life survives from P. times. The rocks can be dated by the examination of certain radioactive minerals present and a determination of the length of time they have been subject to radioactive decay. P. rocks contain valuable mineral deposits, including gold, iron, nickel, chromium, uranium, and copper. P. rocks make up much of Africa S. of the Sahara, nearly 2,000,000 sq. m. of Canada, much of W. Australia, Brazil and Antarctica, and extensive areas of Siberia. (See also ARCHAEOAN.) Smaller areas of P. occur in Wales, NW. Scotland, and at isolated points in England (Malvern, Charnwood, the Lizard). The largest European P. terrain forms the Scandinavian Baltic Shield.

Precedence depends partly upon letters patent and statute and partly upon ancient custom. In England questions of P. are generally referred to those officers of the council of the earl-marshal of England to whom is assigned the arrangement of public processions on state ceremonial occasions. In Scotland matters of P. are regulated by the officers of the Lyon Court (see LYON KING-AT-ARMS). In strict constitutional law the sovereign has, as complementary to the prerogative right to create new titles or dignities, the right to confer any P. he pleases (see Coke's *Institutes*, vol. iv). But apparently he may not create a peerage with a right of P. inconsistent with the Act of 1640, which regulates the P. of all the nobility and great officers of state. He may, however, create baronets with P. before knights baronets, knights of the Bath, and knights bachelors, and grant both rank and P. before even the great officers of state and any peer of the realm to a foreign prince marrying into the royal family (see Halsbury's *Laws of England*).

The official table of P. will be found in such reference books as *Burke's Peerage*. The sovereign is at the head, followed by

the Prince of Wales and other sons, brothers, uncles, and nephews of the sovereign, and ambas. Then come the Archbishop of Canterbury, lord high chancellor, Archbishop of York, Prime Minister, lord president of the council, Speaker of the House of Commons, lord privy seal (if of baronial rank or above), lord great chamberlain, earl marshal, lord steward of the household, lord chamberlain, and master of the horse (these last 5 if dukes). Next follow dukes, marquesses, earls, viscounts, bishops, secretaries of state (if barons), barons, certain officers of the household, secretaries of state not barons, knights of the Garter, privy councillors, chancellor of the exchequer, chancellor of the duchy of Lancaster, lord chief justice, master of the rolls, lords justices of appeal, lords of appeal, puisne judges, baronets, members of orders of knighthood, co. court judges, companions, members, and officers of various orders, gentlemen entitled to bear arms. Sons of peers, baronets, knights, etc., rank in a manner decided by the rank of the father, a duke's eldest son, for example, taking P. after a marquess, and the eldest son of a marquess after an earl.

In the U.S.A. the order of P. is as follows: Sovereign or president of a foreign state, the President, the vice-president (in the absence of the President), ambas., chief justice of the U.S.A., the vice-president (when President present), the Speaker of the House of Representatives in Congress, associate justices of the supreme court, the secretary of state, the secretary of the treasury, foreign ministers plenipotentiary, the secretary of war, the attorney-general, the postmaster-general, the secretary of the navy, the secretary of the interior, the secretary of agriculture, the secretary of commerce, the secretary of labour, senators, the House of Representatives, the chief of staff of the army and the chief of naval operations, general of the army (5 stars), fleet admiral (5 stars), generals (4 stars), admirals (4 stars), governors of states, etc. Rank is always official, i.e. Mr Smith who is 'His Excellency the Ambassador' ranks above a prince or duke who is officially a secretary of embassy.

Precedents. In law, judicial decisions, whether interlocutory (see INTERLOCUTORY PROCEEDINGS) or final, which serve, as a rule, for the determination of analogous or similar cases are called P. P. have the force of law (Bentham's *Judge-made Law*), and no court will reverse a previous judgment of a court of equal, or co-ordinate, *a fortiori* of superior, authority. Thus the decisions of the House of Lords are binding on all other courts, those of the court of appeal on that and all other courts below the House of Lords, and those of the various divs. of the high court on those divs. (see ROYAL COURTS OF JUSTICE) and all courts of inferior jurisdiction. The decisions of co. court judges and of the judges of the tribunals of the U.S.A. may be and often are cited in the Eng. courts, but are, as Prof. Salmond styles them, of *persuasive*

but not *authoritative* efficacy (see also LAW REPORTS).

Precentor, dignitary in an Anglican cathedral, originally the leading singer in the choir, but also in charge of the vocal church music and superior to the organist. His seat is opposite that of the dean (who takes the *Decant* side) on the *Cantoris* side of the chancel. In some churches in Scotland, where the organ or other musical instrument is not employed, the P. is the leader of psalmody.

Preceptory, see **TEMPLARS**.

Precession, see **GYROSCOPE**.

Precession, a westward movement of the equinoxes on the ecliptic so that they advance to meet the stars and the sun on its ann. return. Observations of the brighter stars over many years led Hipparchus about 125 BC to the conclusion that the lat. of the stars were fixed but the longs. increased. Although he did not know the reasons for this phenomenon, he was able to measure its effect with a fair degree of accuracy. The longs. of the stars increase by 50·2" annually, and as a consequence the sidereal year (the time required for the sun to move round the ecliptic) is greater than the tropical year (the interval between 2 successive passages of the sun through the first point of Aries). The difference between the two years is 20 min. 23 sec. Owing to P. the signs of the zodiac do not now agree with the constellations, and the first point of Aries (q.v.) is in the constellation of Pisces. The cause of P. is the pull of the sun and moon, the moon in particular, on the equatorial bulge of the earth. The tendency of the pull (actually a couple) is to make the equator coincide with the ecliptic, but the spinning of the earth prevents this and the phenomenon of P. takes place, a good illustration of which is seen in a spinning top when its axis is not vertical. Its head moves round comparatively slowly in a circle so that its axis describes a cone whose vertex is its point. The axis of the top can be taken to represent the earth's axis and the horizon the ecliptic, but as the tendency of gravitation is to pull the axis of the top towards the horizon while the attraction of the sun and moon tends to pull the earth's axis perpendicular to the plane of the ecliptic, the P. in the latter case is in a direction opposite to that in the former, assuming that the earth and the top spin in the same direction. The changes in the longs. of the stars imply changes also in their right ascensions and declinations which are always used by astronomers in defining their positions. The poles of the equator perform a movement round the poles of the ecliptic in about 26,000 years, just as the axis of the top performs a movement round a vertical line through its point, but the motion is not absolutely uniform, nor do the poles of the equator move exactly in circles. This is due to certain fluctuations in the disturbing couples of the earth, and in consequence the earth's poles describe wavy curves, a phenomenon known as nutation (q.v.). This is often seen in a spinning top, the

head 'nodding' to and from the vertical so that it describes a wavy curve. The pole star (q.v.), which is less than 1° at present from the point in the heavens to which the earth's axis is directed, was not always the pole star, nor will it be so in the future, P. causing different stars to occupy this position. See also **VEGA**.

Precious Stones, see **GEM**.

Precipitate Ointment, one of 2 ointments containing mercury compounds. Red precipitate is red oxide of mercury (HgO); while white precipitate is mercuric ammonium chloride (NH₄HgCl). Both are used locally for skin affections.

Precipitation. If one of the products of the chemical reaction between substances in solution is insoluble, that product is thrown out of solution, i.e. it is precipitated. The substance thrown out of solution is termed a precipitate and the action is termed P. The characteristic precipitate formed by substances affords methods of qualitative and quantitative analysis.

Predestination, divine provision and preparation of benefits by which those who are freed from sin and its consequences are most certainly saved. This is St Augustine's definition (*De Dono Persev.*, cap. 14). The doctrine of P. is contained in the Bible in such passages as Eph. i. 4 f., 11, and especially in Rom. viii. 29 f., and is accepted in some form by all Christian churches. The difficulty is to reconcile the divine provision and the certainty of the prepared benefits with the freedom of the human will. In favour of strict P., Aquinas is found against Duns Scotus, the Jansenists against the Jesuits, the Calvinists against the Arminians, Whitefield against Wesley. For the hist. of patristic opinion see Petavius (*De Deo*, ix, x). See **CALVINISM**. See J. Forbes, *Predestination and Free Will*, 1878; J. B. Mozley, *Augustinian Doctrine of Predestination*, 1883; *Dictionary of Theological Catholicism*, XII (pp. 2809-3022), 1948.

Predicables, term in scholastic logic, used in connection with the scheme of classification borrowed from Porphyry. There are 5 P., viz. genus, species, difference (*differentia*), property (*proprium*), and accident. The first 2 name the greater and lesser classes of things, a genus comprehending sev. species. The difference distinguishes various members of the same genus; the property is a distinction that is not ultimate; while the accident is any peculiarity not connected with the nature of the species. See also **UNIVERSAL**.

Predictor, device for locating the position of moving targets, used mainly with anti-aircraft guns. The guns are linked with radar equipment which picks up enemy aircraft, plots their course, range, and speed, and feeds this data to the gun-control mechanism.

Pre-emption, or **Purveyance**, anct royal prerogative by virtue of which the king enjoyed the right to purchase provisions and necessities for the royal household at a fair price, in preference to every

competitor, and without the consent of the owner. Payment was generally made in exchequer tallies, the amount being deducted from the next taxes paid in by the deluded vendors. Naturally a system liable to such abuses was the subject of frequent petitions and numerous statutes. The prerogative was not finally surrendered until 1660, when the king gave up his rights in consideration of fixed composition, Parliament agreeing to settle on the crown the hereditary excise on all beer and ale sold in the kingdom, together with a proportionate sum for certain other liquors.

Pre-existence, doctrine that man's soul had an existence apart before it became united to the body. It is eastern in origin, and in the E. it is generally associated with the doctrine of the transmigration of souls. Thus it is held by the Buddhists, and formed part of the Pythagorean system. Plato also upheld it, unless we may regard his language on the subject as purely symbolical. Philo Judaeus also taught the doctrine of the P. of the soul, and from him it was adopted by Origen. It was condemned at the Council of Constantinople, and 2 main views of the origin of the soul were then open to acceptance. The belief in P. is countenanced by such names as those of Kant, Schelling, the younger Fichte, Lessing, Schopenhauer, and Jean Reynaud. The idea has been poetically treated by Tennyson in his *Passion of the Past* and by Wordsworth in his *Intimations of Immortality*.

Prefect, in France, political functionary in some respects analogous to the sheriff in England, but vested with far greater powers. The P. possesses extensive powers of municipal regulation. This office, estab. in 1800, was modified under the constitution of 1946.

Preference and Preferential Trade, see PROTECTION and PROTECTIONIST LEGISLATION.

Preference Share, see COMPANY.

Prefloration, see AESTIVATION.

Prefrontal Leucotomy, see INSANITY; PSYCHOSIS.

Pregl, Fritz (1869-1930), Austrian chemist, b. Laibach. From 1913 he was prof. at Graz. He worked out the methods of microanalysis of organic matter, for which he received the Nobel prize for chem. in 1923.

Pregnancy, period of intra-uterine development of the fertilised ovum. The time varies with the species of animal, and in human beings the average duration is from 274 to 280 days. Amenorrhoea (cessation of the menstrual periods) is the first symptom of P., but as there are other causes of amenorrhoea, it is not diagnostic. Irregular haemorrhages may occur in pregnancy, but there is no authenticated instance of normal menstruation continuing during P. Further symptoms which, taken in conjunction with amenorrhoea, are strongly presumptive of P. are morning or evening nausea and vomiting, usually noticed as from about the sixth week, a craving for certain foods

and an aversion for others, low backache, frequency of micturition, and often a feeling of depression and irritability. The breasts become enlarged and a small secretion of serum may be expressible from them. From the third month onwards the pigment of the nipple and surrounding areola begins to get darker. The growing foetus starts to make movements at the eighteenth week, and the feeling of these movements for the first time by the mother is referred to as 'quickening.' The gravid uterus begins to rise out of the pelvis after the third month, and from this time onwards may be felt through the abdominal wall as a gradually enlarging spherical tumour. Quickening may be regarded as diagnostic of P., but the only really positive clinical sign is that of the foetal heart beats, which may be first heard at the sixth month. From the first month onwards P. may be positively diagnosed by biological tests. The Aschheim-Zondek test consists in injecting the patient's urine into immature female mice. If the patient is pregnant a premature maturation of the animal's ovarian follicles is observed. In a similar test, the Friedman test, rabbits are used instead of mice. Yet another test, the Hogben or xenopus test, consists in injecting a small quantity of the patient's urine into the dorsal lymph sac of a female African toad. A deposit of 6 or more eggs within 4-12 hrs indicates that the patient is pregnant. These tests depend upon the presence of an excess of gonadotrophine in the urine of pregnant women.

P. is a physiological condition, and in a normal, healthy woman is best regarded as such. In the absence of any contra-indication, modern practice is to allow the pregnant woman to lead as normal a life as possible within the natural limitations imposed by her physical condition. At the same time the ante-natal period is now regarded by obstetricians as of great importance. By regular examination from when P. is first suspected, obstetricians and midwives are able to observe abnormalities in their earliest stage and take steps to correct them. The first examination consists in an investigation into the general health, including family hist., the patient's own medical hist., and her previous obstetric hist., if any, and measurements of the pelvis and blood-pressure recordings are made. The urine is tested for any signs of kidney disease. A sample of blood is taken and tested for the presence or absence of Rh antibodies (see OBSTETRICS), the blood group is ascertained and the Wassermann reaction (q.v.) done. From the information gathered at this first examination the attendant is able to foretell to a large extent the future progress of the P. The mother is instructed in the simple rules of health, advised on diet, including the taking of supplementary vitamins, and she may be put in touch with an ante-natal clinic where she may attend mothercraft classes and be taught relaxation exercises. Particular points which are

watched for in the regular examinations during the ensuing months are signs of toxæmia (*see below*), and the growth of the foetus and its position in the uterus. Normal birth depends upon an object of fixed size being pushed through an aperture of fixed size. If there is a disproportion between the measurements of the two, difficulties will arise. In pregnancy the 'object' is the foetal head and the 'aperture' is the bony, or pelvic, part of the birth canal. Ante-natal examinations in the later months enable the obstetrician or midwife to estimate the fit of the foetal head in the pelvis. This can usually be ascertained by manual examination, but in doubtful cases X-ray examination may be made. If the foetus is growing too large for the pelvic aperture premature labour may be induced at or about the thirty-sixth week, or, if the disproportion is severe, caesarian section is performed. The foetus normally lies in the uterus head downwards and with its back towards the front of the mother's abdomen. This is known as the occipito-anterior position with the vertex (or head) presenting, and it is from this position that birth usually takes place. Sometimes the foetus lies so that its head is at the top of the uterus and its sacral region lowermost. This is known as a 'breech' presentation. The obstetrician usually corrects this before birth by doing what is known as a 'version,' i.e. the foetus is turned by manual manipulation in a complete somersault so that the previous breech presentation is reversed into that of a vertex. The liquor amnii, or fluid within the uterus, makes this manipulation possible, since the foetus literally 'floats' in this liquor. Ante-natal examinations also enable the attendant to diagnose any other abnormalities in the lie of the foetus and to obtain advance information of a multiple pregnancy.

Complications of P. may be divided into those of the foetus and those of the mother, although it must be realised that as mother and baby share a common circulation they are indivisible, and the condition of one affects that of the other. Any severe illness in the mother is also suffered by the baby, and may in some instances prove fatal to it. Death of the foetus and its premature expulsion may occur at any time during P., and often no obvious reason for this can be found. Up to the twenty-eighth week of P. the foetus is incapable of a separate existence, and its death and expulsion is called an abortion (q.v.). After the twenty-eighth week it is called a stillbirth. Other foetal abnormalities are those concerned with malformations and are more a problem of labour than of P. Toxæmia of P. is a complication which is characterised by a rising blood pressure, renal insufficiency, albuminuria, and uræmia (q.v.) and, if not treated, leads to a condition which is characterised by convulsions and is known as eclampsia. In the absence of treatment this condition may end fatally from uræmia and cerebral oedema. Toxæmia of pregnancy occurs in the later

months of P., and is usually insidious in onset. The symptoms are headache, increasing swelling of the feet, ankles, hands, and face, and, in advanced cases, disturbance of vision. The cause of toxæmia of P. is not exactly known. One theory is that in some way the foetus acts as a poison to its mother, perhaps by overloading the maternal system with an insupportable burden of metabolic waste products. Another theory is that the increasing tension of the uterine muscles brought about by the advancing P. sets up a reflex spasm in the renal blood vessels, thus causing a lack of blood flow through the kidneys and a failure of excretion of toxic waste products. Whatever the cause, toxæmia of pregnancy is usually relieved by the birth of the foetus. Treatment consists in absolute rest and diet. If these fail to relieve the symptoms the foetus has to be delivered prematurely. If P. is allowed to continue it may lead to eclampsia and prove fatal to both mother and foetus. In some cases—about one in one thousand—the placenta, or after-birth, is abnormally placed over the outlet instead of to one side of the body of the uterus. This abnormality may cause severe hæmorrhage towards the terminal stages of pregnancy and necessitates operative intervention and blood transfusion. In this event the advantage of having ascertained the mother's blood group at the first ante-natal visit is well proved. *See OBSTETRICS.*

Prehistory is generally defined as the story of events and conditions before written or recorded hist. The scientific study of the wide range of remains and monuments of the prehistoric period is known as Archaeology (q.v.). It should be noted, however, that the boundary between P. and hist. is often difficult to determine. In Britain, for instance, the earliest cultures of the Palæolithic (the Old Stone Age) are dated very approximately 550,000 years B.C., while the dividing line between P. and hist. is usually placed at the Claudian Conquest in A.D. 43. On a strict interpretation, the Maoris of New Zealand were still in the Stone Age when Capt. James Cook visited the Is. just after the middle of the 18th cent.; and a further indication of the nature of the difficulties involved in fixing the boundary of P. is shown by the fact that the Minoan civilisation of Crete, which used a form of writing, is always considered as prehistoric. The study of P. can also throw light on early hist. which is not well documented. The invasion of the Belgæ into Britain in the Early Iron Age, for example, is quite well known from reliable literary sources, but the archaeologist, in his investigation of the remains of the field-systems introduced by these peoples, has been able to demonstrate their new method of agriculture based on the use of the heavy wheeled plough, which opened up the fertile clay lands of the riv. valleys.

There has perhaps been no time when man has not been interested in the remains of his predecessors, but in Britain

sev. factors have had a profound influence on the study of P. and the development of archaeology. The Industrial Revolution, with its great extension of urb. life, was responsible for an era of discovery which has scarcely been surpassed; the followers of the Romantic movement, in Britain as on the Continent, looked upon the mouldering skull, the ant potsherds, and the dolmens with an excited pleasure, to which they were able to add a neo-Celtic appreciation of the Druids and, on frequent occasion, an attempt at antiquarian exploration. The third factor, and the one of greatest significance, was the acceptance of Darwin's theory of evolution and its application to the study of human origins.

Side by side with these main influences were others, among which should be noted the pioneer topographical work of John Aubrey (1626-97), and other antiquarian topographers exemplified by Wm Stukeley (1687-1765); the formation of co. archaeological societies in the early part of the 19th cent.; the pub. of a classification of Dan. antiquities (1844) in accordance with the succession of stone, bronze, and iron, first formulated by Lucretius; and more particularly the discoveries (1845) at Abbeville in the Somme valley of humanly worked flints, together with an elephant's tusk in a geological deposit of the Pleistocene Age, which until then had been regarded as of an incredibly remote age. In recent years there has been a phenomenal increase in the volume of data available to prehistorians. The field of study is consequently wider. While in Britain certain geographical areas (e.g. Wessex and Sussex) and certain cultural periods (e.g. the Neolithic and the Early Iron Age) tend to be prominent by reason of the prolificity of noted and estab. workers, it should not be overlooked that in considering the greater field, the prehistorian's study is on a wide scale: no longer does the Palaeolithic mean W. Europe, for example, but E. Europe, Africa, and Asia in addition. Indeed, it is no exaggeration to say that the focus of studies of earliest man has now moved from Kent and E. Anglia to Africa, China, and Malay.

In his study of the remains of early man the prehistorian considers and interprets age, material, function, and social environment. The quest for food and dwelling, the conditions of commerce, trade, labour, and communications, the way of worship, the presence of peace or war, and finally the burial and disposal of the dead, all come within his view. Discovery is the first concern, and then interpretation, and the two processes meet in excavation, the examination of a site by modern scientific method. The very great advance in our knowledge of P. made in recent years is largely the result of improved excavation technique. No longer is brilliant excavation confined to Egypt and the Near E. The Viking ships at Oseberg and Ladby, the Neolithic vil. at Köln-Lindenthal, near Cologne, the palisade barrows of the Early

Bronze Age in Holland, and Maiden Castle and the Sutton Hoo ship-burial, both in Britain, are evidence enough of a faultless technique in Europe.

The chronology of P. is both relative and absolute.

The framework provided by the 3 successive technological ages of stone, bronze, and iron is a beginning of ordered arrangement; it is borne out in stratified deposits, that is, for example, in the successive undisturbed layers of human occupation in a cave or a dwelling-site, and stratigraphy thus determines that the oldest relics come from the lowest layer. The chronology furnished by stratigraphy is relative; it does not determine the duration of the various periods, and it does not, in general, prove that a period in one area is contemporary with that in another. A cross-bearing is sometimes possible upon the historic civilisations, and the early historic periods of Babylonla, Egypt, and Crete are so used, but the reservation that the beginning of the Dynastic period can only be dated to c. 3100 BC is enough to show the limits of the system. Typology, and the study of progressive evolution or degeneration, is applied by the prehistorian to pottery form and decoration, to weapons, and to trinkets, and by its use, with certain well-known reservations, a relative chronological sequence can be obtained. Outstanding examples of the use of typology are Abercromby's identification (in 1901) of the Beaker Folk of the Bronze Age and their continental home by a study of their characteristic sepulchral pottery, and Collingwood's systematic chronology (in 1930) of Rom. brooches.

Absolute chronology is provided by geology and by changes in climate which have taken place over a considerable part of the surface of the earth. Analyses of pollen from the peat bogs of Britain, Scandinavia, the Alps, and other parts of central Europe have reflected the hist. of forest and vegetation in the epoch known to geologists as Recent. There are 3 main phases known in one terminology as Pre-Boreal, Boreal, and Atlantic, and in others by a system of numbers. So accurate is the process of pollen analysis that the layers of peat-bogs can be divided into intervals of a cent. In Britain it has been used with striking results in the Cambridge fens. In the Pleistocene epoch a time-scale is provided by the Glacial Periods, the Interglacial Periods between them, and by Pluvials, periods of heavy rain, which fell in some regions now dry, such as Rhodesia and Persia. The question is complicated, and recent studies of solar radiation, although most valuable, have not lessened the difficulties. Geochronology is still developing as a science. The work of de Geer in Sweden as long ago as 1885 made possible the counting of the exact number of years occupied by the withdrawal of an ice-sheet, and in recent years the work of Prof. Zeuner in London has been directed to many other aspects of its study and application. It remains to mention

dendrochronology, the science of determination of date by observation of the annual growth-rings of trees. The possibilities of its use to the prehistorian in dating the timber-work of buildings cannot be over-estimated. The use of vivianite as dating material, once loudly proclaimed, is now abandoned. See also **ARCHAEOLOGY** for further information on

obtained by astronomical and radiocarbon dating; and that the culture there described as Chellean is now known as Abbevillian from a type-site at Abbeville, a district of Amiens in the Somme. Reference should also be made to the chart of the cultural traditions of early man in Africa, Asia, and Europe in K. P. Oakley, *Man the Tool-Maker*, 1949, and to the

TABLE I

1	2	3	4
<i>Years</i>	<i>Geological Period</i>	<i>Archaeological Culture</i>	<i>Archaeological Stage</i>
0	RECENT	See Table II	Mesolithic
50,000	ICE AGE (Würm)	Magdalenian	Upper Palaeolithic
100,000		Gravettian	
150,000		Mousterian	
200,000	Interglacial 3	Levalloisean Clactonian Chellean-Acheulean	Middle Palaeolithic
250,000	ICE AGE (Riss)		Lower Palaeolithic
300,000	Interglacial 2		
400,000			
	ICE AGE (Mindel)		
500,000	Interglacial 1		
	ICE AGE (Gunz)		
600,000	PLIOCENE		

All later archaeological periods occupy such relatively short times that they cannot be shown separately on this scale. Table II continues the above on a scale one hundred times as great.

absolute chronology; and ANCIENT MONUMENTS; BEAKER FOLK; BRONZE AGE; FLINT IMPLEMENTS; IRON AGE; MEGALITH CULTURE; STONE AGE.

The tables on pp. 202, 203, after Childe and Zeuner in *Progress and Archaeology*, set out a chronology of P.: (1) the earlier archaeological states with their probable geological equivalents and estimated duration in years; and (2) later archaeological and historical periods. It should be noted that the first column in each table is liable to revision, especially in the earliest periods, as new knowledge is

tables of the Pleistocene in Europe and E. Africa and the Postglacial in N. Europe in Wm Watson, *Flint Implements*, 1950, an account of Stone Age techniques and cultures. See also M. C. Burkitt, *The Old Stone Age*, 1949; L. S. B. Leakey, *Stone Age Africa*, 1936; C. F. C. Hawkes, *The Prehistoric Foundations of Europe*, 1940; Grahame Clark, *Archaeology and Society*, 1957 ed.; V. G. Childe, *Man Makes Himself*, 1948 ed.; *Prehistoric Communities of the British Isles*, 1949 ed.; *The Dawn of European Civilisation*, 1950 ed.; S. R. Mitchell, *Stone Age Craftsmen*,

TABLE II

<i>Years</i>	<i>Hither Asia</i>	<i>Egypt</i>	<i>Greece</i>	<i>North-western Europe</i>	<i>Climatic Phase</i>
AD 1000	Islamic	Islamic	Byzantine	Dark Ages	
500--	--	--	--	--	
0	Parthian Seleucid	Roman Ptolemaic	Roman Hellenistic	Roman La Tène	Sub-Atlantic
BC 500	Persian Neo-Babylonian	Persian	Classical	Hallstatt	
1000	Assyrian	--	Archaic Dark Age	Late	Sub-Boreal
1500	Hittite Kassite	New Kingdom	Mycenaean	Middle Early	
2000	Babylonian Dark Age Age of Ur III Akkadian	Middle Kingdom Dark Age	Middle		
2500	--	Old Kingdom	Early Minoan and Helladic	Neolithic	
3000	Early Dynastic Jemdet Nasr	Proto-dynastic			Atlantic
	Uruk	Predynastic	Neolithic		
4000	al'Ubaid	--	--	--	
	Halafian	Merimidian		Mesolithic	
5000	† Neolithic Sialk I.	--	†	--	
6000	† Natufian	--	--	--	Boreal
7000	--	--	--	--	

1949; Stuart Pigott, *British Prehistory*, 1949; F. E. Zeuner, *Dating the Past*, 1950; the *Proc. Prehist. Socy.* in course; and the Ordnance Survey Period Maps of Ant. Britain, and the Regional Guides to Ant. Monuments pub. by the Ministry of Works.

Pre-Islamic Inscriptions, see ORKHON.

Prelate (from Lat. *Præfero*) one who has been preferred or promoted; name given to the higher dignitaries of the church, such as archbishops, bishops abbots, and certain members of the papal court.

Prelude. In music, introductory piece forming the first movement of a suite or other sectional work; also one paired with a fugue, to which it forms an introduction. From the 18th cent. onwards it is sometimes a separate concert work, especially for piano (Chopin, etc.) or orchestra; and from Wagner onwards the orchestral introduction to an opera where it does not take the form of a detached overture and leads straight into the first act. A special type was the chorale prelude for organ played in the Lutheran church service in Germany to apprise the congregation of the next hymn-tune (see CHORALE PRELUDE).

Premature Birth, see ABORTION; OBSTETRICS.

Premier, see PRIME MINISTER.

Premium: 1. In insurance, the amount paid by the insured either as a single or a periodical payment to secure the protection of a policy which may provide for the payment to the insured or his representatives of a sum as indemnity for loss of or damage to goods; or as compensation to employees or third parties; or a fixed sum at death, according to the type of policy. See also INSURANCE.

2. In stock or share dealing, the excess in the value of any securities over the price of issue.

3. A bonus or sum given for the loan of money over and above the interest.

4. A P. bond is one carrying with it the chance of winning a money prize (see below).

Premium Savings Bonds, a wholly new form of national savings designed to appeal to the small saver; introduced by Harold Macmillan, the chancellor of the Exchequer, in the April 1956 Budget. 'Bond' meant that the money could be returned when it was asked for; 'Savings' indicated that the Bonds were a form of saving; and 'Premium' indicated that prizes could be won by holders of the Bonds. The last was the new element.

For some time after the Second World War, and indeed since Keynes's *General Theory of Employment, Interest and Money* of 1933, there was discussion among economists of the decreasing propensity to save following the redistribution of income in favour of those with small incomes. The argument was that the bulk of personal saving was traditionally done by those who received the larger incomes, while wage-earners saved little. Therefore the effect of social services, increasing equality of opportunity, and the Welfare State, by shifting

income from the better-off to the not-so-well-off, was to reduce the volume of private saving. In the special inflationary circumstances after the war there was also, it was argued, little incentive to save in order to receive the small yield of 3 or 4 or even 5 per cent, since the real yield would fall as prices rose. Lastly, the large amount of money laid out in stakes on football pools and other forms of modest gambling by those with small incomes was also considered a symptom of the wish to achieve wealth, even though the chances were small. For all these reasons opinion moved towards the view that what was necessary to evoke saving from the large number of people whose incomes were small but yet who had a reserve for saving after buying necessities was an inducement more spectacular and dramatic than that of the usual interest on saving or dividend on investment. This can broadly be said to be the theoretical background to the emergence of P. S. B.

The Bonds were on sale from Nov. 1956. Each unit cost £1, and Bonds for any number of units from 1 to 500 could be bought at post offices, at commercial banks, and at Trustee Savings Banks. Every Bond carried a number or numbers for as many £1s as it represented. These numbers went into a draw which took place every month from June 1957 to discover the numbers of the prize winners. The prizes came from a pool of money formed from the payment by the Government of 4 per cent on all the Bonds in the draw. Thus, instead of each Bond holder receiving 4 per cent interest on his Bond, he stood a chance of receiving a much larger sum as a prize. For every £1m. interest, there are 100 prizes of £1000 each, 200 of £500 each, 400 of £250 each, 1000 of £100 each, 2000 of £50 each, and 20,000 of £25 each.

A second novel aspect of these Bonds was that the numbers were to be drawn from a scientific robot called the 'Electronic Random Number Indicator Equipment'—referred to by its initials as 'ERNIE.'

The announcement of the Bonds provoked political and religious criticism. It was considered that the State should not encourage gambling in any form and that it was degrading for the country to have to incite its citizens to save by the offer of prizes. But the opposition was not sufficient to stop the plan. In general, it received the sanction of public opinion; and it may be that in the new social and economic environment of the postwar Welfare State, some such means of encouraging saving by those who had never saved before was indispensable.

Premonstratensians, order founded by St Norbert about 1120, which receives its name from Prémontré in the diocese of Laon, France, where the first monastery was founded. Its rule was that of St Augustine, and the discipline was very severe. The order spread rapidly throughout Europe, and for sev. centuries was a serious rival to the Cistercian order.

At the time of the Reformation there were in England 35 houses of the order, of which 2 were nunneries, but there is now only 1 abbey, at Storrington, Sussex, and 3 small priories.

'Prensa, La', Argentine daily newspaper, founded in 1869 by José Paz, and pub. in Buenos Aires. One of the leading S. American papers, it became famous for its political independence and free criticism. Frequently attacking the Perón régime, La P. was suspended by the gov. in Jan. 1951 and, in Nov. of that year, re-pub. as a mouthpiece of the gov.'s policy. After Perón's fall, the paper was restored to its former ownership in Nov. 1955. See *Defence of Freedom*, by the editors of *La Prensa*, London, 1952.

Pre-Parliament, colloquial description of the Temporary Council of the Republic set up at the Democratic Conference in Russia shortly before the seizure of power by the Bolsheviks in 1917. It functioned as a consultative body to the Provisional Gov. (q.v.) and had the right to question ministers. See W. H. Chamberlin, *History of the Russian Revolution*, vol. 1.

Pre-Raphaelite Brotherhood, primarily a group of 3, W. Holman Hunt, D. G. Rossetti, and J. E. Millais, whose aim constituted a reaction against current art traditions and proclaimed the 'return to nature.' This reaction was in some ways akin to Fr. Impressionism (see IMPRESSIONISM); it revolted against the 'grand style' and the arrogant allegory of the Romantics, and discarded the technical device of working on a dark-brown ground with a composition of 80 per cent shadow. To a certain extent, therefore, it was foreshadowed in the canvases of Constable, Turner, and Bonington. At the same time Hunt, Millais, and Rossetti identified themselves with the artistic ideals of simplicity and sincerity which they had found in the works of Raphael's precursors, and thus called their fellowship the P.-R. B. Thus the elements of realism and of a return to the past are both to be found in it. Strictly, the P.-R. B. numbered 7 members, though the movement was to acquire many adherents. The lesser members were Thomas Woolner, sculptor and poet, James Collinson, an obscure painter, Wm Rossetti, brother of the painter and a poet of ability, and F. G. Stephens, who became an art critic. To the two latter the P.-R. B. was indebted for critical defence in the columns of the *Athenaeum* and *Spectator*. W. H. Deverell, who died young, was a member of the group if not of the Brotherhood. See P. Bates, *Pre-Raphaelite Painters*, 1897; D. G. Rossetti, *Pre-Raphaelite Letters and Diaries*, 1900; W. H. Hunt, *Pre-Raphaelism and the Pre-Raphaelite Brotherhood*, 1905; and W. Gaunt, *The Pre-Raphaelite Tragedy*, 1942.

Prerogative, Royal, see CROWN.

Prerogative Court. The P. C. of the archbishop of Canterbury was an old eccles. court which had jurisdiction to deal with disputed wills until 1857, when its functions were transferred to the Probate Court (q.v.).

Prerogative Writ and Orders are processes issued by the divisional court of queen's bench (q.v.) not as of right but in exercise of the Crown's extraordinary power to assist the subject on proper cause shown. The P. W. is *habeas corpus* (q.v.) and the P. O. are *mandamus* and *prohibition* (q.v.).

Presburg, see BRATISLAVA.

Presbyopia, see OPHTHALMOLOGY.

Presbyterianism, form of church gov. in which the leading part is taken by presbyters or elders. It stands, therefore, somewhat midway between the 2 systems of Episcopacy and Congregationalism. In the former, authority rests with the bishop, in the latter with the individual congregations. In P. authority rests with a succession of councils, each consisting of ministers and elders. Presbyterians themselves claim that P. is identical with or akin to the order of apostolic times. The present system owes its estab. to the Fr. reformer Calvin. This took place at Geneva, and the system spread widely, though in somewhat modified forms. It is important to notice that P. primarily denotes a form of church gov., so that under this title come many bodies differing in their confessions of faith. Generally speaking, all the Presbyterian bodies are Calvinistic. The Presbyterian Church has but one spiritual order, that of Presbyters, though the Presbyters are divided into ministers and elders. The minister occupies the chief position in each congregation, dispenses the Sacraments, and conducts the services of the church. There are sev. elders to each church, and though ordained by the Presbyters they are actually laymen. They assist the minister in matters of discipline, and they may be described as the 'ruling elders,' while the ministers may be described as the 'teaching elders.' The deacons are not concerned with spiritual matters, but have charge of the money for the poor, and in some cases have the general financial control of the church. The Presbyterian constitution is as follows: Each church or par. is under the care of the Kirk Session, which consists of the minister and elders of the particular church. This is the lowest of a series of courts of judicature, and controls the discipline of the congregation which it represents. The minister is the moderator *ex officio*, and without the presence of the minister or a deputy appointed by him no meeting can be held. The Kirk Session has no control over the minister, who is responsible to the Presbytery alone; hence his independence is assured. Above the Kirk Session is the Presbytery, which consists of all the ministers in a given dist., and one elder from each par. The moderator is elected from among the ministers. This court is held at regularly fixed intervals, but may be called at other times. It has the supervision of the entire dist. from which its members are drawn, and forms a court of appeal from the Kirk Session. The Synod, which normally meets twice a year, represents a number of Presbyteries in the same way as the

Presbytery represents a number of congregations. Above it, and forming the final court of appeal, comes the General Assembly, which meets annually, and represents the whole church by means of ministers and elders sent from each Presbytery. It supervises all the work of the church, conducts missionary enterprises, and generally superintends the interests of the whole body. A moderator is chosen at each Assembly, and each year the place and time for the next Assembly are agreed upon. There is a difference of opinion among Presbyterians on the question of church estab. The dominant personality of many of the early leaders often tended towards a theocracy. The majority of modern Presbyterians, however, favour a cessation of the union between the state and the church. The spiritual independence of the church has been a fundamental tenet of P. from the beginning. In Scotland, since the union of 1729, it is now acknowledged by the state. The doctrines of P. are Calvinistic and evangelical, and the large number of doctrinal confessions which the various churches have produced show almost entire agreement. The Eng. and Scottish churches accept the Westminster Confession, and the Larger and Shorter Catechisms. The N. church has also the Scottish Confession of 1560. Other confessions are the First Helvetic, (Genova, Gallican, Frisian, Belgian, Dutch, Hungarian, and Bohemian. The worship proceeds, broadly speaking, on the lines of the *Directory of Public Worship*. Most churches have now official books of order for the guidance of ministers; there are, however, no compulsory forms. The chief countries in which P. has taken a firm root are Scotland, Switzerland, England, France, Ireland, the Netherlands, and the U.S.A. (For Scotland, see SCOTLAND, CHURCH OF.) The Swiss and Fr. churches were formed exactly on the model of Calvin. The Presbyterian Church in England traces its origin to the Puritan nonconformists. During the 18th cent. these declined rapidly in numbers, and many of them became Unitarians. A revival in P. came in the last cent., largely by Scottish influence, and the association between the Eng. Presbyterians and the Church of Scotland became very close. Ireland has also very closely followed the Scottish model. In modern P. the ecumenical spirit is increasingly strong; it has made possible in the United Church of S. India a combination of episcopacy with Presbyterian essentials. P. in the U.S.A. may be said to have begun about 1640, the first Presbytery being that of Philadelphia in 1704. It now forms a most flourishing body, and in 1949 its total number was given as 3,349,073 in all the various branches, including the Negro churches. See T. M. Lindsay, *History of the Reformation*, 1907-8; J. Moffat, *The Presbyterian Churches*, 1928; C. L. Warr, *The Presbyterian Tradition*, 1933; and J. L. Ainslie, *The Doctrine of Ministerial Order in the Reformed Churches of the 16th and 17th Centuries*, 1940.

Presbytery, in ecclies. architecture the sanctuary, or that part of the choir of the church in which the high altar is placed. The name is sometimes extended to the whole choir. Also a modern Rom. Catholic clergy-house.

Prescelly Hills, in NE. Pembrokeshire, Wales, rising to 1760 ft (in Mynydd Prescelly), and crossed by a primitive trackway. The E. section of these hills provided the blue-stones used in the building of Stonehenge (q.v.); blue-stones are found in Britain only in this region.

Prescot: 1. Urb. dist. and par. of Lancs, England, 3½ m. WSW. of St Helens, with manufs. of electric cables, plastics, and sheet-metal platings. P. also has printing works. Pop. 12,500.

2. Or Prescott, tn and port of entry, Ontario, Canada, on the St Lawrence R., 49 m. SSE. of Ottawa. There are marine works. Pop. 4200.

Prescott, William Hickling (1796-1859), Amer. historian, b. Salem, Massachusetts, educ. at Harvard Univ. In early life he lost the use of one eye and the other became almost useless, but with the aid of readers and secretaries he prepared his book on *The History of Ferdinand and Isabella* during 1827-38. This was followed by *The Conquest of Mexico*, 1843, *The Conquest of Peru*, 1847, and *History of Philip II*, 3 vols., 1859, unfinished.

Prescription, in law, broadly speaking, is that right given partly by common law (q.v.) and partly by the Prescription Act of 1832, by which a person claims to be entitled, as owner, to easements or profit *à prendre* over or from the lands of another (see INCORPOREAL HEREDITAMENTS and LAND LAWS) on the sole ground of long user. By the common law a man who could not show an express grant (see GRANT) might successfully show either: (1) that he and his ancestors had from time immemorial (the time of legal memory is the accession of Richard I) had undisputed enjoyment of a right in gross (i.e. not dependent on any estate in land held by him or his predecessors), or (2) that he and his predecessors in title, as owners of certain lands, had from time immemorial had some easement over or profit *à prendre* (q.v., and see COMMON, RIGHT OF) from certain other lands. Later this excessive rigour of proof was mitigated by allowing evidence of uninterrupted user for upwards of 20 years to stand as conclusive proof of immemorial user unless rebutted by proof that the enjoyment had in fact begun within the time of legal memory. This remains the law of P. as to (1), but as to (2) the owner of the dominant tenement may prove his title to a right over the other or servient tenement either as above or under the Prescription Act, which Act has greatly shortened the requisite periods of uninterrupted enjoyment. Under this Act 30 years give a *prima facie* right, 60 years an indefeasible right, to a profit *à prendre* (subject in the latter case to the effect of some agreement incompatible with the claim); 20 and 40 years are the respective periods for easements (q.v.),

and an indefeasible right to light is conferred after 20 years (*see* LIGHTS, ANCIENT). The periods are calculated backwards from the date of any action brought against the prescribing owner, and no act is to be deemed an interruption unless acquiesced in for 1 year after the party interrupted shall have had notice of it.

In Scotland the term covers various rules of law which have as a common element the effect of lapse of time but are widely different in their result. The positive prescription is that by which 20 years' possession of land is held to fortify a title thereto or determine the extent thereof. The negative prescription is that by which obligations are extinguished. The period, formerly 40 years, is now, with a few exceptions, 20 years. Other prescriptions limit methods of proof or determine the effect of documents after varying periods.

Presentation, act by which the patron of a vacant living presents to the bishop for institution the clerk whom he has chosen to fill it. When the appointment lies with the bishop himself, he is said to 'collate,' not to 'present,' to it.

Presentation at Court, *see* COURT.

Preserved Foods. Food preservation aims at retaining the colour, flavour, aroma, and texture of fresh produce for an indefinite period so that it may be consumed outside its natural growing season and in parts of the world where the fresh produce is not available. The causes of deterioration in fresh produce are chemical and biological changes which proceed sometimes quite slowly, sometimes with great rapidity. The biological changes are in general more pronounced than chemical changes and are the result of infection by and growth of micro-organisms, i.e. bacteria and moulds. The means by which growth and development of these micro-organisms is arrested or prevented constitute the science and practice of food preservation. In drying or dehydration the water which is essential for growth of bacteria and moulds is removed. The process is accompanied by a considerable reduction in bulk. Salting and pickling are adopted as a means of curing or preserving both animal and vegetable products and rely on the retarding effect of salt and acid on the growth of harmful micro-organisms. A further commonly employed method of preservation involves the addition of chemical preservatives such as borates, benzoates, and sulphur dioxide, commonly used, for example, in sausages and fruit drinks. The use of chemicals harmful to the consumer is closely regulated by the Food and Drugs Act. A high concentration of sugar acts as a deterrent to bacterial and mould growth, and is an important aid to the keeping properties of jam and confectionery. Canning relies on the destruction by heat of micro-organisms which would otherwise cause spoilage. Most frequently, but not exclusively, it involves sealing the material to be preserved in a glass or metal container prior

to the application of heat. Almost any type of perishable food may be preserved by this means.

François Appert, in the early part of the 19th cent., was the first to apply the preserving process by sterilisation, that is, by placing the food in bottles or cans, and after hermetically sealing the containers subjecting them to heat for a specified time. Much progress, however, has been made since those days, both as regards the containers used and the scientific control of the canning processes. For example, the tops and bottoms of most cans used nowadays are hermetically sealed without the use of solder.

As canned foods are cooked when sealed in the tin, they retain a large proportion of the vitamin and other nutritive constituents of the corresponding uncooked foods, and for this reason are extensively used on ships and for voyages of exploration, where fresh produce is not available. To obtain the full nutritive value from canned fruits and vegetables, both the solid and liquid portions of the contents of the can should be used.

Freezing, with which may be included chilling, has made rapid strides in recent years as a means of food preservation. Refrigerated ships now transport food in bulk all over the world, while quick-frozen foods in small packages provide a convenient means of internal distribution of food, which by this method more nearly retains its original characteristics than by any other means of preservation.

Condensed milk is either whole or skimmed milk evaporated to about one-third of its bulk; there are two varieties, sweetened and unsweetened. It is preserved in cans, which after hermetical sealing are submitted to a high temp. to ensure sterilisation. Under the Food and Drugs Act condensed milk, other than that labelled 'skimmed' milk, must conform to certain regulations as to minimum milk fat content. Powdered milk, made from either entire or skimmed milk, is largely used also in making certain manufactured foods. For the preservation of foods at home, *see* PRESERVING.

Preserving. If not carefully treated, many fruits will decompose rapidly when attacked by bacteria, moulds, or yeasts, and the problem of their preservation is how to protect them from these. Winter pears and apples, however, may be stored to bring them to perfection. A fruit-room should be cool and shady, but at the same time dry and airy, and sunshine should be avoided. The fruit should be gathered before it is ripe, handled carefully, and laid out separately on slatted trays or wrapped in paper to prevent contact with other fruit. Periodically the fruit should be examined, and any showing signs of decay removed.

The 3 prin. methods of P. fruit and vegetables are: (1) dehydration or drying, i.e. the evaporation of almost all water, this being one of the earliest known methods; (2) sterilisation, or the killing by heat, low temps., or freezing of harmful germs or bacteria; and (3) the addition

of chemical agents such as sugar, salt, vinegar, or sulphur.

DEHYDRATION OR DRYING. This is achieved either naturally or artificially, i.e. in the open air by the sun and wind, or in ovens or hot cupboards. In Australia, California, and parts of France, the Near and Middle E., and other dry and warm countries, apricots, currants, dates, figs, peaches, pears, raisins, sultanas, etc., can be dried naturally; but the moist climate of the Brit. Isles is usually unsuited for this method, and the oven, hot cupboard, or warm room is substituted. As in all methods of P., fruit and vegetables should be freshly gathered, quite sound and ripe, but not over-ripe, and washed free from dust and grit. Apples should be peeled and cored, and cut into rings. Soaking in cold salted water (1 teaspoonful to a pint) will preserve the colour and prevent browning. Pears may be treated in a similar way, sliced lengthwise after being cored; plums and apricots should be stoned and halved. Apple rings may be threaded on sticks, and other fruit laid on muslin-covered trays. Oven temp. should be from 120° to 150° F., with the door left slightly open. Heat should be gradual, i.e. low at first to prevent outside hardening, bursting, or swelling of the fruit. The drying may be done intermittently over 2 or 3 days, or, if continuous, about 6 hrs should be sufficient. The fruit or vegetables (protected from dust) should be left in a warm room to finish off the drying, and then tested by pressing sev. pieces together in the hand. These should feel pliable and springy, but not brittle, and no moisture should be seen. Before using dried fruit it should be soaked in water for 24-48 hrs, and boiled slowly until quite tender, when sugar may be added. Vegetables, such as broad beans, string beans, mushrooms, marrow, etc., may be dried in the oven, but root vegetables, such as carrots, turnips, swedes, etc., are better stored in clamps or sand. Herbs, such as parsley, mint, sage, and thyme, should be gathered before flowering, and when quite dry. These need only 1 hr in the oven at about 120° F.; or they may be hung in muslin bags in a warm room, or placed above a stove for 3-4 hrs. Parsley may be dried in a hot oven for a few minutes only, which will preserve the colour. The dried leaves should be crisp, and may then be crushed and stored in air-tight tins, or if put into bottles they should be stored away from strong light.

STERILISATION. P. by heat may be done in jars or bottles, or by the home-canning method. Acid fruit is easier to sterilise than vegetables, and for various reasons the P. of the latter at home is not recommended. It can be done, however, but special experience and equipment are necessary. Vegetables contain heat-resistant bacteria and lack the acid necessary to kill bacteria. The high temp. needed to sterilise vegetables requires a pressure cooker (*see PRESSURE COOKERY*), which is a necessary part of the equipment, and great care is needed in carrying

out the process. The addition of small quantities of an acid, such as vinegar or lemon juice, to a non-acid vegetable or meat does not change the acidity of the food enough to permit processing in the boiling-water bath. This can be done only if enough acid is added to pickle the food. (*See Bulletin No. 1762, Home Canning of Fruits, Vegetables, and Meats*, issued by the U.S. Dept of Agriculture.)

Home Canning needs special equipment, i.e. a sealing machine, steriliser, and cans. Fruit should be prepared as for bottling, and packed into cans within $\frac{1}{2}$ in. from top. The covering liquid should be boiling syrup. The loose lid is placed on the can, which is sealed immediately and placed in a pan of boiling water. The water must be reboiled quickly, and held at boiling-point for 10-20 min., according to the contents of the tins. The cans should be quickly cooled to blood heat by standing them in running cold water. As previously stated, vegetables need higher temps. to sterilise than fruits, and a pressure cooker must be used. Meat, game, poultry, and fish can be canned, but they present special problems, and should not be attempted by the inexperienced or in the absence of a pressure cooker.

Bottling. The art of bottling fruit has long been practised, and is still a popular and inexpensive method. Simple apparatus, such as ordinary jam-jars with special or home-made air-tight caps or lids, may be used quite successfully, but special bottling jars, complete with glass cap and metal screw bands, can be bought. All utensils, jars, bottles, caps, etc., should be scrupulously clean and free from defects. Fruit should be fresh, clean, and ripe, except gooseberries, which should be green and under-ripe; over-ripe or unsound fruit should be discarded. The methods of bottling are by the water-bath method, the oven method, and in a pressure cooker. The water-bath method can be varied, using either: (a) the slow method, or (b) the quick method. Similarly, variations in the oven method are possible, by using: (a) a slow oven, or (b) a moderate oven. For the water-bath method it is recommended that a special steriliser be used, i.e. a pan with a false bottom and a lid with a hole in which the thermometer is placed. An ordinary deep pan or fish kettle may be used, but it is essential to have an extra bottom to place inside the pan; this may be a double piece of cardboard. It is important to have a bottling thermometer to obtain the correct temp. for sterilising yet P. valuable vitamins, and also to keep the flavour and colour of the fruit. For the slow water-bath method the fruit is packed into bottles, and cold water or cold syrup (made from $\frac{1}{2}$ to 1 lb. of sugar, or golden syrup, boiled in 1 pint of water; peaches require the maximum amount of sugar) should be poured over the fruit to the neck of the bottles; and rubber rings and clip lids or glass tops with screw bands are then fitted on the containers. Other air-tight seals may be obtained by using paraffin wax, mutton fat, porosan skin, or layers

of grease-paper dipped in white of egg or milk. After being screwed down bands should be undone slightly (a half turn is sufficient) to allow air to escape during heating. The filled and capped bottles are put into the steriliser, which is then filled with cold water up to the top of the bottles; the steriliser or pan is then put over a low heat, allowing the temp. to rise gradually (in 90 min.) to 165–190° F., according to the type of fruit. The recommended temp. should be held for 10–30 min., according to the requirement of the contents. The bands should be adjusted securely on the removal of the bottles from the steriliser.

For the quick water-bath method, the syrup or water is heated to a temp. of 140° F. before pouring on to the fruit. Warm water of a temp. of 100° F. is used in the steriliser; this is raised to simmering point (190° F.) in 25–30 min., and maintained at that temp. for 2–50 min. according to the requirements of the fruit.

In the slow-oven method bottles are packed with fruit, without any liquid, capped loosely, and put into a low oven (250° F.) for 40–60 min. While the jars are in the oven boiling water or syrup should be made ready; jars or bottles should be removed from the oven singly, filled quickly with the boiling liquid, and sealed instantly. When the bottles are quite cool (allowance of at least 12 hrs) they should be tested by removing the screw bands or spring clips and lifting the bottles by their lids, so proving the vacuum. If any lids are loose the fault must, if possible, be detected and sterilisation repeated.

In the moderate-oven method boiling syrup or water is added to the fruit before processing, the bottles are capped loosely and put into a moderate oven (300° F.) and maintained at that temp. for 30–90 min., according to the type of fruit and quantity being processed. The jars are sealed immediately they are taken from the oven. Any fruit, whole, sliced, or pulped, may be bottled. Good results are obtained in the P. of apples, apricots, black-currants, cherries, damsons, gooseberries, peaches (skins should be removed by plunging the fruit in boiling water for 1 min., and then into cold water), pears (preferably ripe, but if unripe they must first be stewed before packing into bottles), plums, and young rhubarb. Tomatoes should be firm and just under-ripe, and skinned like peaches; packed whole, quartered; or pulped (*see below, Pulping*). The water method is recommended for tomatoes, as a temp. of only 190° F., raised in 1½ hrs, is needed, and held for 20–30 min. Tomatoes should not be brought into contact with any copper utensils.

Pulping is another way of storing fruit and tomatoes. Preparation is the same as for bottling, but cooking is first done in a saucepan with a little water (sugar may be added to the fruit and salt to the tomatoes). The boiling pulp is poured into previously heated bottles and sealed immediately, but to ensure complete

sterilisation the bottles must be put into a steriliser or pan of hot water, and held at boiling point for a few minutes.

CHEMICAL AGENTS. Sugar is used in large quantities in the making of jam (q.v.), and also for crystallising fruit. Salt when used in sufficient amount preserves food, yet does not affect its nutritional value. Runner beans, sliced, or Fr. beans whole, may be successfully preserved if packed in jars with the addition of alternate layers of salt (1 lb. to 3 lb. beans). The packed jars should be closely covered; and when the beans are required for use they should be well washed to remove the salt before cooking. Vinegar is used as a preservative in the making of chutneys, pickles, sauces, etc. Sulphur has been used for many years to preserve fruit, and can now be obtained in the form of fruit P. tablets. This method is useful for P. temporarily large quantities of fruit. The tablets should be dissolved in cold or slightly warmed water, which is poured into jars packed with prepared raw fruit and then made air-tight. Red fruit becomes discoloured in the solution, but regains some of its original colour when boiled. The sulphur method may be used for stone fruit, but should not be used for blackberries, black-currants, cherries (sweet), gooseberries, pears, tomatoes, or vegetables. Before using fruit preserved in this way it is important that the sulphur dioxide should be driven off by boiling the fruit in an open pan for at least 10 min. Sugar may be added afterwards, when the fruit will be ready for use in pies or puddings, or may be made into jam.

FRUIT SYRUPS. The fruit should be fully ripe and freed from grit by washing through a colander; large fruits should be pulled to pieces. It should be placed in an aluminium or thick enamel saucepan, with a little water if necessary. A wooden spoon is used to crush the fruit against the sides of the pan, which is heated until the juice has been extracted over moderate heat; this may take from 10 to 20 min. The pulp is then strained through a fine sieve, and finally through a jelly bag. Sugar, from ¼ to ½ lb. per pint, is added after the straining. A final clearing through one layer of butter muslin is necessary to get rid of any solids left by the sugar. The syrup should be bottled as soon as possible, all corks being boiled for 15 min. before use. A space of at least 2 in. must be left between the top of the syrup and the cork, which is then tied with string or wire. It is necessary to be assured that the corks are quite air-tight.

Eggs. These may be preserved in several ways, but should be new-laid if possible, less than 7 days old, and clean and free from cracks. They may be smeared with lard or oil, and buried separately in bran, and the process repeated after every 6 or 8 weeks. In the water-glass or silicate-of-soda method the eggs are immersed in a liquid solution in stone pots, pitchers, or jars. As the eggs must be completely covered by the liquid, any

evaporation should be made up periodically. A further method is dipping the eggs into a proprietary sealing liquid and storing them dry (preferably with separating divs.) in baskets or boxes; the eggs preserved in this way will keep up to 12 months. Eggs, hard-boiled and shelled, may be pickled in vinegar.

Commercial P. of food is described in the article PRESERVED FOODS.

See also WINES, HOME-MADE.

See C. Grange, *Bottling and Preserving*, 1931; Mrs Arthur Webb, *Preserving*, 1947; and Ministry of Agriculture and Fisheries, *Domestic Preservation of Fruit and Vegetables* (Bulletin 21), and *Good Housekeeping* pubs.

President, one who 'presides' over or directs. In classical Latin, *praeses* was the title of a prov. governor, and in England, in the 17th cent., P. was used for the king's 'lieutenant,' who had extensive powers delegated to him. In the final constitution of the U.S.A. the head of the Federal Gov. was called P. This is the most common meaning of the word, the head by election of a modern rep., such as the U.S.A., France, S. Amer. states, Switzerland, etc. The P. of the U.S.A. has more power than any similar official elsewhere. The Amer. P. is commander-in-chief of the U.S. Army and Navy. The title of P. is also given to the heads (or sometimes in Great Britain to the second in importance) of colleges and univs., to the person presiding over the meetings of learned societies and conferences, and in Great Britain to some ministers of the Crown and Judges.

President of the Council, Lord, in Great Britain one of the great officers of state, who presides over meetings of the privy council. Since 1680 the office has been a political one, held by a member of the party in power, who is usually a leading member of the gov. See PRIVY COUNCIL.

Prešov: 1. Region (*kraj*) in NE. Czechoslovakia, bordering on Poland and Ukrainian S.S.R., part of the former prov. of Slovakia (q.v.). It has a central plain, watered by tribs. of the Tisza (q.v.), and has mts of the Carpathians (q.v.) in the NW., N., and NE. Area 3280 sq. m. Pop. 448,500.

2. (Magyar Eperjes) Czechoslovak tn, cap. of the region of P., on the Torysa. It is the seat of a bishop, has an 18th-cent. cathedral, and has a large trade in agric. produce; it manufs. machinery. Pop. 20,400.

Press, Freedom of the. In the language of constitutional law, this phrase implies hardly more than that the P. no less than the individual, enjoys full liberty of discussion, subject only to the ordinary law of libel. Strictly the trend of modern legislation is to exempt journalists from the maximum of liability incurred by other persons, provided that what was inserted in the P. was inserted without spite and in good faith. This higher measure of liberty is a direct reversal of the state of things during the heyday of the Star Chamber, when public opinion, the only true champion of popular

liberties, was incapable of expressing itself in its most effective manner through the medium of the P. Among historians it is almost an axiom that the F. of the P., far from being estab. by any formal pronouncement, was the indirect and accidental result of the refusal of the Commons, in 1695, to re-enact the Licensing Act of 1662 (see CENSORSHIP OF THE PRESS; DRAMA; NEWSPAPERS). This result is no doubt eminently in harmony with the practical, if unscientific, methods of the Brit. law-giver; but it is inconceivable that the Commons, with the memory of *Histrionastix* in their minds, and the lines of the *Areopagitica* before their eyes, were not perfectly well aware of the probable consequences of their action. The General Council of the Press was estab. in 1953, one of its objects being to preserve the freedom of the Brit. press (see further under NEWSPAPERS). See also JOURNALISM.

Press, General Council of the, see NEWS-PAPERS.

'Press, The,' New Zealand prov. newspaper, pub. in Christchurch and circulating throughout the prov. of Canterbury and the W. Coast. Substantial coverage is given to world, national, and local affairs, with special emphasis on agriculture.

Press Association, The, founded 1868, largest Brit. home news agency and also a part-owner, with London and Commonwealth newspapers, of Reuters, the leading Brit. world news agency. The P. A. is owned by the prin. newspapers of the U.K. (outside London) and Eire. It provides London and prov. newspapers by means chiefly of its own private telegraph system over wires leased from the post office, with a complete service of home news, including general, parl., courts, and all branches of sport, and newspapers outside London with the overseas news services of Reuters. The P. A. special reporting service supplies special reports of events of local interest to daily, weekly, and trade newspapers, and also to periodicals. In addition, the P. A. serves London and prov. newspapers with a daily photograph service, including photographs by wire to prov. newspapers when required. In conjunction with the Exchange Telegraph Company the P. A. supplies over its private telegraph system or by telephone or tape machine services reports of cases heard at the royal courts of justice, stock exchange and commercial news, racing results and betting, and football and cricket scores. The head office is at 85 Fleet Street, London, E.C.4.

Press Club, London, leading P. C. of the Brit. Empire. It was founded in 1882 with George Augustus Sala as its first president; its membership in 1956 numbered 1836, comprising tn, country, overseas, associate, life, and honorary members. President, Col. the Lord Astor of Hever of *The Times*; secretary-manager, Mr. A. Lazenby. Membership is strictly journalistic.

The club was estab. by parl. journalists in the days when the House of Commons

often sat far into the night, and transport to suburban dormitories was inadequate to bridge the gap between the last night and early morning trains. It changed from one home to another, making its last move from Wine Office Court to Salisbury Square in 1914. Since then its activities have greatly expanded. On the social side they include a widely varied series of functions, outstanding among which is the ann. Derby lunch, founded by Edgar Wallace when chairman of the club (1923-4). It has a well-stocked reference library, with a strong section on the hist., technique, and personalities of journalism, and notable collections of the Brit. press from its foundations in the early 17th cent. to the war-time press of 1939-45, with a Book of Honour in memory of the journalists and press photographers throughout the empire who lost their lives in the two world wars. Address: 7 St Bride's House, Salisbury Square, Fleet Street, E.C.4.

Press-forging, see METALLURGY (FABRICATION OF METALS).

Pressburg, see BRATISLAVA.

Presses Universitaires de France, Fr. publishing house, estab. in Paris in 1921 as a co-operative concern, 'to diffuse French culture.' The firm has become one of the leading publishers in France in the fields of contemporary philosophy and psychology, history, and reference books, written mainly by profs. of the Sorbonne Univ. More than 700 pocket-books of general knowledge entitled *Que sais-je?* have been issued.

Pressgang, name given to the detachment of officers and men commissioned to execute warrants for the impressment of men to serve in the Brit. Navy. They generally consisted of a captain, 2 lieutenants, and a body of picked men. A rendezvous was chosen, and volunteers were enlisted, deserters arrested, whilst all able-bodied men were liable to be pressed. By an Act of 1835 the period of compulsory service for men impressed for the navy was limited to 5 years. The employment of the P., though in abeyance, is still legal.

Pressure, Centre of, see CENTRE OF PRESSURE.

Pressure and Pressure Gauges, see HYDROSTATICS; GAS AND GASES; PIEZOMETER; COMPRESSION AND COMPRESSIBILITY; METROLOGY.

Pressure Cookery. Pressure cooking is a method used for accelerating the process of cooking with water, by means of apparatus or utensils which produce pressures greater than atmospheric. By this means cooking is carried out at temps. greater than the ordinary boiling point of water. At normal atmospheric pressure at sea-level, water boils at 212° F., whereas if the pressure is doubled (i.e. increased by about 15 lb. per sq. in.) it will boil at 250° F. It is this higher temp. which accelerates the cooking process, so that, for example, a stew will require about 25 min. in a pressure cooker at 15 lb. per sq. in., compared with four

or five times as long in an ordinary saucepan. Because of the shorter time involved, fuel consumption is reduced.

The forerunner of the modern simple pressure saucepan, as well as of the larger digesters still in use for processing meat bones, was the digester invented by the Frenchman Papin in 1679. The principle still most commonly used is the same, whereby the pressure of steam generated in the cooker is regulated by a valve which allows the steam to escape when it has reached the predetermined pressure. Most pressure cookers have, in addition to the release valve, a further safety device which releases the pressure if, for some reason, the release valve does not function.

The pressure attained in most models is 10-15 lb. per sq. in., but some of the newer models have devices, usually a series of weights on the valve, by which more than one pressure can be used. The common values of pressures used, and their equivalent temps., are: 5 lb. (228°), 10 lb. (240°), 15 lb. (250°), 20 lb. (259°), 30 lb. (277°). These different pressures make it possible to choose those which give temps. most suitable for different types of food, so that frozen foods can be cooked at lower temps., vegetables at intermediate temps., and meat and soups at higher temps.

The pressures mentioned will only give the appropriate temps. if the atmospheric pressure is that normally found at sea-level. At high altitudes the atmospheric pressure is appreciably lower, so that water boils ordinarily at a lower temp. For example, at 6000 ft water boils at about 200° F. Ordinary cooking is therefore appreciably slower at these altitudes than at sea-level. With a pressure cooker, however, higher temps. can be achieved and the effect of high altitude overcome.

It has been suggested that the nutritive value of foods will be adversely affected by the higher temps. attained in pressure cooking. As against this, however, the shorter time of the cooking process, the fact that the air in the cooker is displaced by steam, and the smaller quantity of water used, might be expected to decrease the loss of nutrients, such as vitamins which are easily oxidised in air, or vitamins and mineral salts which dissolve in the cooking water. Recently these theoretical views have been tested by experiments in which the effects on the nutrients of various foods have been determined when they are cooked by a pressure cooker and by other means. The results show that the effects of pressure cooking on food generally are either very much the same as, or slightly better than, those found with other good methods of cooking when these are used in ways which are most calculated to conserve nutrients. These experiments have been relatively few and concerned only with some of the nutrients; more work will have to be done before the complete effects of pressure cooking on all the nutrients are known. Experiments made on guinea-pigs by the Swiss Board of Health

in Bern have shown that food which is overcooked in a high-pressure steamer loses its value. The *British Medical Journal* of 2 April 1940 observes that 'So far as can be judged from the limited evidence available, pressure cooking does not cause any greater loss of vitamins than good ordinary cooking. . . . Total immersion of the vegetables in an open saucepan invariably causes much greater losses. . . . But if misuse of the pressure cooker gradually accustoms the taste to very soft potatoes, and brown pulpy vegetables, then the risk of malnutrition is a real one.'

The excessive use of a pressure cooker has its disadvantages, as foods cooked in it are always soft in texture and lack crispness. It has also been proved that some foods—especially fresh meat—when cooked under pressure are inferior in flavour to those cooked by the longer methods. The shortness of the process does not allow time for development of flavour, which is essential in the case of the tough muscular cuts of meat. See COOKERY.

Pressure Welding, see WELDING.

Prestation, see CORVÉE.

Prestatyn, urb. dist. of Flintshire, Wales, on the coast, 205 m. from London. It is a holiday resort with a fine background of mt. scenery. Pop. 8910.

Prestbury, par. and vil. of Cheshire, England, 3 m. from Macclesfield, with a 13th-cent. par. church, a small Norman chapel, remains of a Saxon cross, and the original stocks. Pop. 1700.

Prestelgne, urb. dist. and co. tn of Radnorshire, Wales, on the R. Lugg. The dist. attracts many visitors for trout and grayling fishing and for shooting, and the tn is picturesque, with timbered buildings, quaint cottages, and an historic 15th-cent. church. Assizes and quarter sessions are held in the shirehall. Pop. 1200.

Prestor John, probably mythical character, supposed in the Middle Ages to rule over a vast domain in the interior of Asia. Efforts were made by the Popes to communicate with him. According to popular belief he was a Christian priest as well as king. The report may have originated with the Nestorian missionaries of Mesopotamia, who penetrated into Persia, India, and Tartary. Later P. J. was identified with the King of Ethiopia. The Portuguese quest for P. J. began in 1415 after the conquest of Ceuta. But the European legend of a P. J., fabulously rich and powerful, vanished when the Portuguese, with great loss of life, saved Abyssinia from Muslim domination. See F. K. T. Zarneke, *Der Priester Johannes*, 1876-9; Sir H. Yule, *Cathay and the Way Thither*, 1866; and E. Sanceau, *Portugal in Quest of Prester John*, 1943.

Preston, co. and municipal bor. and seaport in Lancs, England, on the Ribble, 21 m. SSE. of Lancaster, with which it is connected by canal. It is the administrative centre for the co. Buildings include the Harris library, art gallery, and museum, and Harris Institute, founded in

1882, municipal building (1933), the tn hall and guild hall, seriously damaged by fire in 1947, and the public hall. P. Grammar School was founded in the 14th cent., and there are sev. other schools, a technical college, and colleges of further education. P. has a number of hospitals and sev. public parks, including Avenham, Miller, Moor, Grange, Ibbleton, Haslam, and Ashton. The churches in P., sev. of which are Rom. Catholic, are all modern. The prin. Rom. Catholic church, dedicated to St Wilfrid, dates from 1793, but in 1879 it was almost entirely rebuilt. The steeple of St Walburga's Rom. Catholic church was designed by Hansom, who invented the hansom cab.

The name P. may be a corruption of *Prebsta-tūn* (Priest's Town), so called because of the number of religious houses once there. A large number of the citizens are Rom. Catholics. P. is referred to in Domesday Book. Henry II granted it a royal charter in 1179: this was followed by others granting various privileges, including the right to have a fair. This fair still exists, but is no longer associated with trade or burgess rights; known as the P. Guild, it takes place every 20 years, first being recorded in 1328, the last celebrations being held in 1952. There was fighting in and around the tn during the Civil war, Cromwell defeating the Royalists there in 1648. P. later became a Jacobite centre. In 1715 the Old Pretender was proclaimed in P. market square; the Jacobite force later surrendered at P. Derwentwater and Kenmore were executed there. In 1745 Prince Charles Edward Stuart visited P. With the rise of industrialism the mansions of the nobility in P. disappeared, among them the mansion of the earls of Derby and that of the Duke of Hamilton. P. was represented in Parliament as early as 1295 and possibly earlier. The first temperance newspaper was founded in P. Francis Thompson, the poet, was b. there.

The manuf. of cotton, especially of fine yarns, is the staple industry. Courtaulds introduced a new industry, the production of viscous rayon yarn, in 1939. Electrical engineering is second in importance. There are steel and iron foundries, and other engineering manufs. include textile machinery, marine boilers, artesian pumps, printing machinery, and aircraft. Other activities are wood-pulp, motor spirit, china clay, and coal distribution. Motor and rubber goods are made in Leyland, near P. Maritime trade has greatly increased since the construction of the large docks and the deepening of the riv. P. corporation is the responsible authority for the port of P. An airport was estab. jointly by the P. and Blackburn corporations in 1939 at Salmesbury, 4 m. from P. Pop. 119,600.

Preston, tn near Galt and 28 m. NNW. of Hamilton, on the Grand R., in Waterloo co., Ontario, Canada. It is a health resort, with mineral springs, and has woollen mills, furniture factories, and machine shops. Pop. 8820.

Prestonpans, burgh and seaside tn of East Lothian, Scotland, 9 m. E. of Edinburgh, celebrated for the victory of Prince Charles Edward over the royal troops under Sir John Cope, 1745. Fire-bricks, tiles, etc., are manufactured, and there are coal mines and a brewery. Pop. 3300.

Prestress Concrete, see REINFORCED CONCRETE.

Prestwich, Sir Joseph (1812-96), geologist, acquired a taste for geology during his scientific studies at Univ. College, London. Made many contributions to Brit. stratigraphy. Was elected F.R.S. in 1853. He was appointed to the chair of geology at Oxford in 1874. In 1886 and 1888 he pub. his admirable handbook of *Geology*. He was knighted in 1896.

Prestwich, municipal bor. of Lancs, England, 4½ m. NNW. of Manchester; it has cotton manufs., but is mainly residential. Pop. (estimated) 36,000.

Prestwick, burgh and seaside resort of Ayrshire, Scotland, on the Firth of Clyde, some 2 m. from Ayr, one of the most popular resorts in SW. Scotland. Here is P. international airport. A golfing centre, it has 3 golf courses, including the famous old P. championship course. The esplanade is 1½ m. long, and there are over 2 m. of broad, sandy beach. The bathing lake has accommodation for 1200 bathers and 2000 spectators. Pop. 11,400.

Presumption. In the law of evidence P.s are inferences from facts already proved or admitted. They are commonly classified into: (a) P.s of law, which are absolute and irrefutable; e.g. that an infant under 7 years of age is incapable of committing a felony; (b) legal P.s, which hold good only unless and until rebutted; e.g. that a child between 7 and 14 years is incapable of committing a felony, but the proof of its mischievous discretion will destroy the P.; and (c) inferences which are mere arguments from probabilities and almost synonymous with circumstantial evidence (q.v. *under EVIDENCE*). In civil actions there are a number of P.s of law as to documents, resting upon the authority of decided cases, which greatly facilitate proof; e.g. that alterations and interlineations appearing on the face of a will, in the absence of all evidence relating to them, were made after the execution of the will.

Pretoria, cap. of Transvaal prov., and administrative cap. of the Union of S. Africa, 35 m. N. of Johannesburg, situated on both banks of the R. Apies, at the foot of the Magaliesburg Mts. It is an important railway junction, being on the direct line to both Johannesburg and Durban. Sir Herbert Baker built the Union Building and the railway station. The Union Building houses the Premier, ministers and their staffs, agric., mining, commercial, and financial specialists, and the heads of the civil service. In the Raadsaal, at present occupied by the gov. of the Transvaal, took place the debates which preceded

the S. African war of 1899. There are sev. churches, the Anglican cathedral of St Alban's being the most notable. The tn has a state library of 80,000 vols., sev. museums, and is the seat of the Univ. of S. Africa. P. Univ. was founded in 1930. There are many schools and a technical college. Onderstepoort, noted for veterinary research, is 10 m. N. of the city. The Radcliffe Observatory was transferred to P. from Oxford, England. There are numerous parks and zoological and botanical gardens; in Oct.-Nov. the jacaranda blossom is a striking feature. Paul Kruger is buried in P. Winston Churchill was a prisoner there in 1899. P. was founded in 1855 by Marthinus Pretorius (q.v.), son of Andries Pretorius, victor of Blood R., after whom it was named. In 1860 it superseded Potchefstroom as the cap. of the Transvaal. In 1900 P. surrendered to Lord Roberts, the Union being constituted 9 years later, when P. became its cap. There are iron and steel, cement, pottery, brick, and leather industries, printing works, and the S. Africa Mint. Pop.: Whites, 150,657; Coloureds, 5674; Asiatics, 6100; Bantu, 120,563. See A. Macmillan, *Enviroms of the Golden City and Pretoria*, 1934; G. S. Preller, *Old Pretoria*, 1938; M. Nathan, *Paul Kruger: his Life and Times*, 1941; and H. V. Morton, *In Search of South Africa*, 1948.

Pretorius, Andries Wilhelmus Jacobus (1799-1853), Dutch settler in S. Africa, and soldier. A leader of the great Boer trek in 1838, into what is now Natal. Early a rival of Hendrik Potgieter, who led his voortrekkers (q.v.) much further N. With a small force of farmers P. defeated Dingaan's army of 30,000 at the famous battle of Blood R. (16 Dec. 1838) and so broke the power of the Zulu. This led to the setting up of a republic of Natal, with P. as first president of the first Volksraad of Natal and chief commandant of its forces. This move alarmed Sir George Napier, the Cape governor, who sent troops to Durban and annexed Natal, the Boers realising the hopelessness of resistance. Offers of farms were made to the Boers, but a considerable number of them recrossed the Drakensberg under the leadership of P. and set up new republics between the Orange and Vaal R.s. But on 3 Feb., 1848 the governor, Sir Harry Smith, proclaimed the annexation of the entire region between those rivers as far E. as the Drakensberg. Recalcitrant Boers, led by P., were defeated at Boomplaats (28 Aug., 1848) and P. fled across the Vaal with a price upon his head; yet within 6 years after that battle the policy of Smith and Lord Grey (colonial secretary from 1846) had collapsed and freedom had been granted to all Boers beyond the Orange. P. early quarrelled with his rival Potgieter, who in 1838 founded Potchefstroom (named after him), oldest tn of the Transvaal, whence parties of burghers left to settle farther inland and prepared to set up their own separate gov. Civil war seemed certain, but ultimately P. succeeded in subjecting all the dists. in the

Transvaal to one gov. without loss of life. The city of Pretoria, founded by his son, Marthinus Wessels (q.v.), was named in his honour.

Pretorius, Marthinus Wessels (1819-1901), Boer commandant-gen. and political leader, son of Andries P., whom he succeeded as leader of military forces in 1853 and as President of the Transvaal in 1864. With Field-cornet Paul Kruger in 1854 he led the Boer punitive force against the chieftain Makapaan—who had massacred Boer women and children while their menfolk were absent hunting—drove Makapaan and his men into a cave, and there disposed of them. P. tried to go farther than his father and marched with a commando to bring the Orange Free State under his rule; but in this he did not at first succeed, and at the Vaal R. matters were settled amicably. Between 1857 and 1869 he was thrice elected president of the new S. African rep. As president of this rep., the Transvaal (1859-63), he made every effort to reconcile the Free Staters to amalgamation with the Transvaal. He also tried, unsuccessfully, to annex Bechuanaland and Delagoa Bay. Following the first Brit. annexation of the Transvaal (1877) P., together with other rebel Boer leaders, joined the insurgent movement, but in 1880 the independence of the Transvaal was recognised.

Preussen, see PRUSSIA.

Prevention of Crime Acts. The Prevention of Crime Act, 1871, provides for the arrest and punishment of convicts out on licence under the Penal Servitude Acts. It enables a court of summary jurisdiction to forfeit the licence if it appears that the holder is getting a dishonest livelihood. In any case, holders had to notify their place of abode to the police within 48 hrs. of their arrival in any place. This provision is abolished by the Criminal Justice Act, 1948. Instead, certain categories of offenders with at least 2 previous convictions after release from prison can be placed under the supervision of a named society or individual. Further, a court of summary jurisdiction can award imprisonment, not exceeding 1 year, to persons who have on former occasions been twice convicted of crime, and who within 7 years from their last conviction are guilty of certain offences or, rather, conduct which leads to the inference that they are again contemplating crime; e.g. they may be so imprisoned: (1) if they refuse to give their names and addresses, or give false ones; (2) if found in any place in such circumstances that the court is satisfied that they are about to commit a crime, and in any case if it appears that they are getting a dishonest livelihood; and (3) if found in any premises or grounds without being able to give a satisfactory account of themselves. The police have power under this Act to search for stolen property in premises which, within the last 12 months, have been in the occupation of persons convicted of receiving stolen property or harbouring thieves, or are, in fact,

occupied by persons who have been convicted of crimes involving fraud and dishonesty. The Home Office is empowered under this Act to make regulations for photographing prisoners, and due provision is made in the Act for the keeping of a register of prisoners by the Scotland Yard authorities for purposes of identification (*see also* FINGER-PRINTS). By the Prevention of Crime Act, 1908, a prisoner who pleads or is found guilty of an indictable crime involving a sentence of penal servitude may, in certain circumstances (*see* CRIMINAL LAW), be charged as an 'habitual criminal.' If found guilty on such further charge, the court could add to his sentence for the specific crime a sentence of 'preventive detention' for any period of from 5 to 10 years. Persons undergoing preventive detention are confined in prisons set apart by the Home Office for that purpose, and subjected to such disciplinary and reformatory influences, and employed on such work, as may be best fitted to make them able to earn an honest livelihood on discharge. Under the Criminal Justice Administration Act, 1914, preventive detention can only be ordered for persons over 30 years of age with at least 3 previous convictions on indictment. It does not now involve an additional sentence, but a single sentence of from 5 to 14 years. The Act also provided for the reformation of young offenders (not less than 16 or more than 21 years of age), convicted of an offence involving imprisonment, by enabling the court to pass sentence of detention in a Borstal institution for a term of not less than 1 year or over 3 years; the minimum of 1 year was raised to 2 years under the Criminal Justice Administration Act, 1914, and under the Criminal Justice Act, 1948, the sentence must always be for 3 years. It is further provided by the Act of 1914 that the young offender shall be under supervision until the end of 1 year after the conclusion of the full period of detention (i.e. with a 3-year sentence until the conclusion of the fourth year from the date of sentence). In the event of unsatisfactory behaviour during the period of supervision he may be recalled to a Borstal institution. Further provision is made for the reformation of young people by the Children and Young Persons Act, 1933, which provides that in dealing with a child or young person the court shall have regard to his welfare by removing him from undesirable surroundings and providing for his education and training. A court may not order a child under the age of 10 years to be sent to an approved school (q.v.) unless for any reason, including the want of a fit person of his own religious persuasion who is willing to undertake the care of him, the court is satisfied that he cannot suitably be dealt with otherwise. The Children and Young Persons Act, 1938, extends the powers of the courts of summary jurisdiction as to the making of orders for the protection, custody, supervision, and care of children and young persons, and for their temporary detention. A juvenile

court's power to revoke an order committing a child or young person to the care of a fit person includes also power to substitute an order placing him for a period not exceeding 3 years under the supervision of a probation officer or some other person approved by the court.

The Prevention of Crime Act, 1953, was passed to check the carrying of such articles as 'coshes' or razors obviously intended to be used as weapons. It is unlawful to carry an offensive weapon in a public place without lawful excuse. An offensive weapon is an article made or adapted for the purpose of causing personal injury or carried for such purpose. The accused must prove that he was carrying an article alleged to be an offensive weapon for a legitimate purpose. A police officer may arrest a person whom he suspects of carrying an offensive weapon. The maximum penalties are: (a) on indictment (q.v.), 2 years' imprisonment and/or a fine of £100; and (b) if tried summarily, 3 months' imprisonment and/or a fine of £50.

See also APPROVED SCHOOLS; BORSTAL TRAINING; CHILDREN AND YOUNG PERSONS; WELFARE OF; JUVENILE OFFENDERS; PENOLOGY; PROBATION.

Prevention of Cruelty to Animals, see ANIMALS, CRUELTY TO.

Prevention of Cruelty to Children, see CHILDREN.

Preventive Medicine, that branch of medicine which aims at the prevention of disease. Personal hygiene promotes the health of the individual, so that he will be better fitted to withstand infection and less liable to acquire disease; it ranges from the pre-natal care of the foetus and the mother to the science of geriatrics, or the health of old age, which is now being increasingly studied. Personal hygiene includes the cleanliness of the body, care of the teeth and mouth, and, so far as possible, the common-sense rules of healthy living. The more that is known of the causes of ill health, the more can a person be advised how to avoid those habits of life which experience has shown to be dangerous. Public hygiene, or public health, is controlled by appropriate Acts of Parliament, administered by the Ministry of Health and by local authorities; it is concerned with such matters as the provision of adequate water supplies and the proper disposal of sewage, the safeguarding of food, and especially milk, superintendence of buildings, and so on. Many infectious diseases, as, for instance, measles, small-pox, scarlet fever, typhoid, puerperal fever, and diphtheria, must by law be notified to the local medical officer of health, so that steps can be taken to prevent their spread. The infant mortality rate, which is regarded as a good index of the effectiveness of P. M., fell from 156 per thousand in 1900 to 34 per thousand in 1950. This remarkable change was due largely to environmental improvements, increase in natural immunity, better personal hygiene, public-health measures against infection,

improved dietary standards, and advances in medical treatment. The advances made in the prevention of infectious diseases by immunisation may claim a large share of the credit due to P. M. The numerous occupational diseases are also controlled by legislation. Under the National Health Act of 1946 medical attention and that of health visitors and other social workers is available to all inhab. of Great Britain. P. M. is of particular importance in tropical dists., where disease such as malaria, yellow fever, and sand-fly fever, with insect vectors, and others caused by intestinal parasites, may be controlled, or even prevented entirely, by the application of adequate preventive measures. See also CHILD; DIET; FOODS AND FEEDING; HYGIENE; PUBLIC HEALTH; SANITATION; SEWAGE; VENEREAL DISEASE; WATER. See British Medical Association, *A Charter for Health*, 1946; J. R. Currie and A. G. Mearns, *Manual of Public Health Hygiene*, 1948; and W. M. Frazer and C. O. Stallybrass, *Text-book of Public Health* (12th ed.), 1948.

Preventive Service, see COASTGUARD.

Prévost, Jacques (1900-), Fr. writer, b. Paris. He began by writing surrealist poetry for Fr. reviews, mostly in the satirical vein. His poems were pub. in book form in *Paroles*, 1946, and *Spectacle*, 1951. He is also well known as an author of film scenarios, his best-known films being *Drôle de Dranie* and *Les Enfants du Paradis*.

Preveza, tn and dept of Epirus, Greece, at the entrance to the Gulf of Arta, 49 m. S. of Janina; exports cheese, butter, wool, olives, and oil. Pop. (tn.) 11,000 (dept) 57,000.

Prévost, Eugène Marcel (1862-1941). Fr. novelist and playwright, b. Paris. His first successful novel was *Le Scorpion*, 1887. Others included *Chronique*, 1888; *Lettres de femmes*, 1892; *Les Demi-Vierges*, 1894 (produced on the stage, 1895); *Monsieur et Madame Moloch*, 1906. His play *La Plus Faible* had a popular run at the Comédie Française, 1904. P. was admitted to the Academy in 1909. His work is characterised by the subtlety of his psychological observation. Later novels include *Mon cher Tommy*, 1920; *L'Art d'apprendre*, 1922; *Sa maîtresse et moi*, 1925; *L'Homme vierge*, 1929. See P. Valéry and H. Bordeaux, *Marcel Prévost et ses contemporains*, 1943.

Prévost, Jean (1901-44), Fr. writer, b. Goderville. His work belongs to the school of Alain; he analysed the life of the senses with clarity and vision. He was killed in the resistance movement during the Second World War. His pub. include *Dix-huitième Année*, 1927; *Épiciens français*, 1931; *Le Sel sur la plaie*, 1935; *Ursone*, 1939, as well as literary criticism, *La création chez Stendhal*, 1942; *Baudelaire*, 1953.

Prévost d'Exilles, Antoine François (1697-1763), Fr. writer, b. Hesdin, Artois, and generally known as the Abbé P. He was brought up by the Jesuits, but abandoned monastic for military life, then

re-entered a monastery, and finally left France for Holland and London. In 1734 he returned to Paris as chaplain to the prince de Conti. He wrote many novels, mostly long and diffuse stories of love and adventure. He is famous chiefly as the author of *Manon Lescaut*, 1731, his one masterpiece, pub. as part of the *Mémoires d'un homme de qualité*, the first part of which appeared in 1728. This story of a destructive passion is related with rare objectivity and psychological insight. Other works of note are *Fils naturel de Cromwell*, 1732, and *Histoire générale des voyages*, 1745-70. As the translator of Richardson's *Pamela* and *Clarissa Harlowe* P. exercised a considerable influence on the literature of his day. See V. Schroeder, *L'Abbe Prévost, sa vie ses romans*, 1898; P. Hazard, *Études critiques sur Manon Lescaut*, 1929, and E. Lasserre, *Manon Lescaut et l'abbé Prévost*, 1930.

Preysing, Konrad von (b. 1880), count of Lichtenegg-Moos, and Ger. cardinal from 1946, b. Kronwinkl. After a diplomatic career he became a priest in 1912, being made Bishop of Eichstätt in 1932, and of Berlin in 1935. With Cardinals Faulhaber and von Galen (q.v.) he was one of the chief leaders in the Ger. Catholic resistance to the Nazi dictatorship.

Priam (or **Priamus**), King of Troy during the Trojan war, the son of Laomedon. As an old man he took no active part in the fighting. He took refuge at the altar of Zeus when Troy fell, but having seen Pyrrhus kill his son Polites, hurled his spear at him and was forthwith killed himself. By Hecuba he was the father of Hector, Paris, Delphobus, Polites, Polydorus, Troilus, Crensa, Polyxena, Cassandra, and many more.

Pribilof, or **Pribilof**, Islands, a volcanic is. in Bering Sea, off Alaska, U.S.A., an international seal reserve. The total area of the group is 170 sq. m., the largest is. being St Paul and St George.

Príbor (Ger. *Freiberg*), Czechoslovak tn in the region of Ostrava (q.v.). Pop. 5500.

Příbram, Czechoslovak tn in the region of Prague (q.v.), 33 m. SW. of Prague city. It has a shrine much visited by pilgrims, and has important lead, silver (worked since 1330), zinc, barium, and antimony mines. Pop. 9100.

Price, Harry (1881-1948), psychic investigator, b. London. He founded and equipped (1925) the first laboratory in Britain for the scientific investigation of abnormal happenings, publishing the results of his researches in Britain and abroad in numerous books, among the best known being *Pollergest over England*, 1945, and *The End of Borley Rectory*, 1946. He investigated the claims of the prin. mediums and visited scores of haunted houses in Britain and sev. European countries. He formed a library of over 20,000 vols. on ghosts, magic, and allied subjects, which he presented to the univ. of London. See his autobiography, *Search for Truth*, 1942, and P. Tabori, *Harry Price—the Biography of a Ghost-hunter*, 1950.

Price, Lillian Nancy Bache (1880-), actress, b. Rochmount, Kinver. She was educ. at Malvern and first appeared on the stage in 1899 at Birmingham. She is most famous as a character actress, especially in such roles as Mrs Alving, in *Ghosts*, and Adeline in *Whiteoaks*. She has also appeared in films. In 1930 she founded the People's National Theatre. She pub. her memoirs, *Shadows on the Hill*, in 1936.

Price. P. is value in terms of money. The P. of an article is the sum of money paid for it. A wage is the P. of labour; and a rent is the P. of the use of land. To say that P.s have risen is to say that the value of money has fallen. A general rise in P. indicates a rise in the quantity of money. According to the original Quantity Theory of Money, if the quantity of money is increased P.s increase proportionately. Such a crude statement needs adjustments to relate it closely to fact. Money must be taken in the modern sense to include not only bank-notes but bank-money (demand deposits); and allowance must be made for expectation as well as for money substitutes and arrangements which economise the use of money. An increase in the volume of trade will require a more or less proportionate increase in the amount of money. Again, an increase in the 'demand' for money (the desire to hold money) will reduce its velocity and be equivalent to a reduction in quantity. Decreases will have opposite effects. With these qualifications the quantity theory may be looked to, not for mathematically accurate results, but for a useful indication of long-run tendencies. For example, the large increase in P.s generally during the Second World War and the 10 years after it was accompanied by a large expansion in the volume of money (of all kinds) in circulation. If all P.s double, relative values are undisturbed. Thus, although there may be a general rise in P.s, there can be no general rise in values.

Under conditions of perfect competition there can be only one P. for identical articles at any one time in the same market. This P. equates, or tends to equate, the quantity offered and the quantity demanded. The 'normal' P. is that which tends to persist over a lengthy period. The normal P. tends, under conditions of perfect competition, to equal the marginal costs of production (including normal profit), supply being increased by a rise in P. and restricted by a fall. While an increase in P. will tend to increase supplies, the increase in supply may, in turn, either tend to reduce P. (in conditions of increasing returns) or to increase P. (in conditions of decreasing returns).

Demand may be relatively elastic or inelastic: an elastic demand will respond markedly to a rise or fall in P.; an inelastic demand will persist substantially in spite of P. variations. P. thus plays a great part in regulating economic activity and adjusting it to the needs of mankind. The P. system needs a framework of law

and institutions, and it may need to be supplemented by free distribution of goods and services to those with low incomes. But as an instrument for allocating resources to alternative uses, it has no near rival. The only substitute system, that of direct allocation by gov. 'planning,' has serious shortcomings. Many of those who were attracted by the possibilities of direct planning now generally accept the merits of a P. mechanism.

It is sometimes denied that the quantity of money is the great determinant of the P. level and maintained that the contrary is true—that the level of P.s determines the amount of money. This counter-argument is valid only while the authorities are content to furnish whatever money is required by the volume of trade and the level of P.s. If the level of P.s tends upwards, owing, for example, to wage pressure, the gov. may meet (potential) inflation by monetary or non-monetary measures. Non-monetary measures could take the form, as at various times after the Second World War, of an attempt to restrict wage increases; while monetary measures mean a deflationary reduction of bank-money by restricting loans (and selling securities).

The condition of perfect competition tends to be unattainable in these days of P.-fixing and monopoly; and with 'imperfect competition' there is no presumption that P. will equal marginal costs of production. The monopolist can either fix his P. or alternatively fix his output: he cannot do both at the same time. The question of manufacturers enforcing retail P.s received much attention after the Second World War. (See *RETAIL PRICE MAINTENANCE*.)

Monopolistic practices are not confined within national boundaries. The control of diamond P.s is world-wide; and both tin and rubber have been subject to international restriction (of production or of export) schemes, and, in the case of tin, to the creation of a 'buffer stock' in the hands of the international body, for the purpose of steadying the market in an unforeseen emergency.

In order to measure the value of money at different periods it is necessary to make a P. index—to record the P.s of a large number of commodities (and services), and to 'weight' them in accordance with the quantities considered to be appropriate to the purpose. Comprehensive indexes are a comparatively modern device, and regard is had to wages or a basic commodity such as wheat to get an idea of the value of money in pre-index times. (Gold P.s are often quoted as representing real values as against 'paper' values; and where gold P.s have themselves kept stable, this is often convenient: but a criterion is necessary by which to determine whether gold itself has kept stable.) Even the best indexes have their limitations, however, and it is important to bear this in mind when using the best available index to give the relative values of money at different times. The Ministry of Labour Cost-of-Living Index

measured P. changes from July 1914 in a working-class budget of 1904-14. It had risen to 56 per cent (above 1914) in 1938 and to 103 per cent in June 1947, when it was discontinued and, pending the estab. of a new basis for a permanent index, replaced by an Interim Index of Retail P.s based on the 1937-8 pattern of working-class expenditure (but not purporting to show the rise in the cost of living since 1937-8). The new 'permanent' Index Number of Retail P.s, based on a survey of household budgets in 1953-4, was begun in 1956. (The earlier series based on June 1947 was continued until Dec. 1956.)

Between 1947 and 1957 retail P.s rose by over 50 per cent; this rise was faster than in any peace-time period of this length in the previous hundred years. About one-fifth of the rise was due to dearer imports, but about two-thirds was due to the rise in money incomes taking place at a greater rate than the increase in output.

Between 1946 and 1949 import P.s of goods and services went up by a quarter, and excessive demand at home and successful pressure for higher incomes caused unit costs of production to rise. As the result, the average level of P.s advanced by nearly a fifth, although there was a period of comparative price stability between 1948 and 1949. The biggest upswing in P.s was between 1949 and 1952, when both import P.s and home costs rose sharply. The P.s of industry's basic materials almost doubled between 1950 and their peak in 1951; devaluation in 1949 had caused the sterling P. of imported commodities to rise, and this was reinforced by a sharp upswing in world market P.s of raw materials brought about by the Korean War. Home costs also rose. The increase in retail P.s stimulated a demand for compensatory increases in wages and other incomes with which output failed to keep up. As a result the P.s of final output rose by nearly a quarter, export P.s of goods and services by a third.

Between 1952 and 1954 there was a second period of comparative stability. Production increased and reduced the high rate of increase in home costs, and basic material P.s fell by a tenth. Wholesale P.s of the output of manufacturing industry and P.s of final output remained almost steady. Export P.s fell steeply, partly perhaps because of growing competition in international markets. The increase in retail and consumer P.s was largely the result of reduced food subsidies and changes in indirect taxes.

In 1955 import P.s rose for the first time since 1951, and home costs increased as incomes once more began to draw away from output. In all, the P. indices increased much faster than they had in the previous period, retail P.s showing the largest rise, mainly because of dearer food.

Apart from the Index Number of Retail P.s and the Wholesale P. Index of manufactured goods, there are several other P. indices in use in Great Britain. One

index measures annually the P.s of all the goods and services imported. A second shows the monthly P. changes of imported materials, foods, and manufactures. Third, apart from the index number of wholesale P.s of manufactured goods, there is also a wholesale P. index of basic materials used by manufacturing industry. A fourth index measures the prices of a year's exports of goods and services; and a fifth the P.s from month to month of exports of goods. Sixth, there is not only the monthly Retail P. Index but also the ann. measure of retail P.s for all personal consumers. Finally, there is an ann. index measuring the P.s of the final output of all goods and services produced for consumption, investment, or export.

The main indices are available annually or monthly. The annual indices, except in the case of consumer P.s, are not published as a continuing series, but are calculated from material given in the annual blue book on National Income and Expenditure.

These indices are used in the following ways. The indices of import and export P.s give a broad picture of the terms on which the U.K. is trading with other nations, and, on the export side, are an indicator of the country's competitive position in foreign markets. The basic materials index covers mainly imported materials, and as the world market P.s of many of these materials are subject to sudden and wide variations, the index often shows substantial swings. This index, and a number of indices of P.s of particular materials, are used by many firms as guides which help them to avoid the keeping of detailed P. records for costing purposes. They also provide a basis for P. adjustment clauses in long-term contracts.

The annual index of P.s of final output can help to show the effect of changing costs on the P.s of all finished goods and services. Individual P. indices for the output of various sectors in industry and particular products are published in the wholesale P.s series.

One use of the consumer P. index is for calculating changes in the internal purchasing power of the £ sterling from year to year; it covers more items of expenditure than the Retail P.s Index. The monthly Retail P.s Index is of particular importance in collective bargaining, and in some industries wage rates are linked to its movements.

The P. of money is the rate of interest. The P. of money may move quite differently to general P.s. After the Second World War general P.s rose, but the P. of money fell. A 'cheap money' policy had made the Second World War a '3 per cent war' as against the 6 per cent paid on long-term loans in the First World War. Short-term rates were also much reduced, 'cheap money' policy having reduced Bank Rate to its low level of 2 per cent in 1932. At that time of industrial depression the 'weight of money' pressed down the rate of interest. This 'cheap

money' was first breached in 1951, when the Bank Rate was raised to 3½ per cent. By 1957 it had reached 7 per cent.

A rate of exchange provides 2 P.s, e.g. the P. of £s in francs and the P. of francs in £s.

St Thomas Aquinas (q.v.) favoured the 'just price,' the P. which gave labour no more than its accustomed standard of life, and throughout the Middle Ages P.s were under control, not only by Church and State, but by the guilds. The Black Death in the 14th cent. played a notable part in breaking up the estab. P. for labour; and P.s for both goods and labour rose rapidly in response to the currency debasement of Henry VIII and the influx of gold and silver from the Americas.

The following figures give some idea of the course of Eng. P.s from the Middle Ages onwards:

	Agric. Labourer's Wage	Wheat ppr Quarter
1261-1350	2½d. per day*	5s. 9½d.
1351-1400	3½d. per day*	6s. 1½d.
1401-1540	4d. per day	5s. 11½d.
1541-1582	6½d. per day	13s. 10½d.
1583-1642	4s. 10d. per week	36s. 1d.
1643-1702	6s. 4½d. per week	41s. 11½d.

* Thatcher

(*Palgrave's Dictionary of Political Economy*, quoting Prof. Thorold Rogers.)

Salient U.K. Wholesale Price Index Numbers

1782	100	1860	99	1908	73
1786	85	1864	105	1913	85
1809	157	1870	96	1920	251
1816	91	1873	111	1923	128
1818	132	1879	83	1924	139
1833	75	1880	88	1933	78
1839	92	1887	68	1937	102
1849	64	1890	72	1938	90
1857	85	1896	61	1947	230
1858	76	1900	75	1955	370
1860	79	1902	69		
		1907	80		

Jevons
(1782-100)

Sauerbeck Statist
(1867-77=100)

Journal of the Royal Statistical Society,
June 1865, and 1948 (IV).

See also MONEY; VALUE; INFLATION AND DEFLATION; RESALE PRICE MAINTENANCE; STANDARD OF LIVING; COST OF LIVING. See G. Crowther, *An Outline of Money*, 1957.

Price Level Policy, see MONEY.

Price Maintenance, see RESALE.

Prichard, Harold Arthur (1871-1948), philosopher. Educ. at Clifton and New College, Oxford, he was a fellow of Hertford College, Oxford (1895-8), fellow and later tutor of Trinity College (1898-1924), and White's prof. of moral philosophy at Oxford from 1928 to 1937. His most

important work was done in the spheres of moral philosophy and the theory of knowledge. He was one of the founders of realism, and in moral philosophy the leader of the intuitionist school or 'Oxford Moralists.'

Prichard, Katherine Susannah (1884-), Australian novelist, b. Fiji. Taken to Australia as a child, she made her home there, but travelled extensively, and worked for a time in Fleet Street. Her first novel, *The Pioneers*, 1915, won the Hodder and Stoughton Prize of £1000, and *Coonardoo*, 1929, was awarded the *Sydney Bulletin* Prize of £500 for the best Australian novel. Others of her books are *Windlestraws*, 1915, *Working Bullocks*, 1926, *The Black Opal*, 1921, and a trilogy written round the Australian goldfields, *The Roaring Nineties*, 1946, *Golden Miles*, 1948, and *Winged Seeds*, 1950. In 1919 she married Hugo V. H. Throssell, V.C., son of a W. Australia Premier; he died in 1933. See also AUSTRALIAN LITERATURE.

Pricking at the Belt, see FAST AND LOOSE.

Prickly Heat, or *Miliaria Populosa*, skin disease common in tropical and sub-tropical lands. It is characterised by inflammation of the sweat-glands, leading to the formation of small red papules, and accompanied by a prickling or tingling sensation. It usually follows an excessive flow of perspiration; it is unaffected by any treatment.

Prickly Pear, see OPUNTIA.

Pride, Thomas (d. 1658), soldier and regicide; he entered the parl. army in 1644 and distinguished himself at Naseby. In 1648, to prevent an agreement with the king, P. stopped nearly a hundred members from taking their seats in Parliament, an act which is known as 'Pride's Purge.' He was a commissioner at the trial of the king and signed the death warrant.

Priene, anct city of Ionia, Asia Minor, some 6 m. N. of the Maeander. Excavations conducted by the Eng. society of Dilettanti (1765 and 1868) and by the German Th. Wiegand (d. 1899) have yielded some magnificent remains which confirm the traditional prosperity of the city in the 4th and 3rd cents. BC. See M. Schöde, *Die Ruinen von Priene*, 1934.

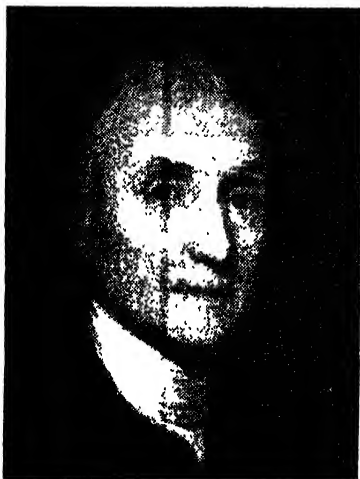
Priest, shortened form of presbyter (Gk *presbuteros*, an elder), minister of public worship, to whom it belongs especially to perform the sacrificial rites pertaining thereto. It seems evident that, in the primitive stages of society, these duties belonged to the head of the family. A later development made the head of the clan the natural representative in religious matters, and this stage can be seen in the biblical accounts of the patriarchal age. As the organisation of society became more defined, the priestly office was in many cases associated with the king. In other religions, such as those of Egypt and India, the P.s form a separate caste. The Jewish priesthood, inaugurated by the Mosaic law, was elaborately developed, and there is a parallel between the Jewish and Christian systems. The Christian

hierarchy was not fully developed until post-apostolic times. In it the priesthood forms the second grade of the sacred ministry, exercising many, but not all, of the functions of the higher grade of the bishop. To the P. belong especially the functions of offering sacrifice, ministering the sacraments, of blessing, and of preaching. See APOSTOLIC SUCCESSION; HOLY ORDERS; and articles on the various religions.

Priestley, John Boynton (1894-), novelist, dramatist, and essayist, b. Bradford. He served with the Devonshire Regiment in the First World War, and after it studied at Trinity Hall, Cambridge. He then went to London, where he worked as reviewer and critic. After publishing 2 novels, *Adam in Moonshine* and *Bewitched*, he scored a noteworthy success with the long *Good Companions*, 1929, which was awarded the Tait Black Memorial Prize and was very popular. *Angel Pavement*, 1930, was also very successful. Others of his novels are *Wonder Hero*, 1933, *They Walk in the City*, 1936, *Let the People Sing*, 1940, *Bright Day*, 1946, *Jenny Valliers*, 1947, and *Low Notes on a High Level*, 1954. His hearty down-to-earth stories are in the Fielding tradition. It 1932 he began as a dramatist with *Dangerous Corner*, and followed it with many plays, of which the chief are *Eden End*, 1935, *Time and the Conways*, 1937, *I Have Been Here Before*, 1938, *Johnson Over Jordan*, 1939, *An Inspector Calls*, 1947, *The Linden Tree*, 1948, *The Glass Cage*, 1956, and the popular comedies *Laburnum Grove*, 1933, and *When We Are Married*, 1938. His books of essays include *Brief Diversions*, 1922, *Apes and Angels*, 1928, *The Balcony*, 1929, *Postscript*, 1940, and *Delight*, 1949. He also wrote lives of George Meredith, 1926, and Thomas Love Peacock, 1927, as well as *A Short History of the English Novel*, 1927, *Midnight on the Desert*, 1937, is autobiographical.

Priestley, Joseph (1733-1804), chemist and divine, b. Fieldhead, near Leeds, and educ. at Daventry, then entered a Dissenting academy. In 1755 he became a dissenting minister at Needham Market, and at Nantwich in 1758. In 1761 he became a teacher in Warrington. He met Franklin in London, and pub. *History and Present State of Electricity*, 1787; LL.D. Edinburgh (1764), F.R.S. (1766). He was literary companion to Lord Shelburne (1773); and was in Paris with him (1774). P. became a minister in Birmingham (1780-91); it was here the mob burnt his house, books, MSS., and scientific instruments. Being left £10,000 and £200 annuity by his brother-in-law, he settled in Pennsylvania (1794). He commenced chem. with carbon dioxide of fermentation in brewery; discovered oxygen from mercuric oxide, etc. He carried out further researches on nitric oxide, hydrochloric acid, sulphur dioxide, ammonia, air, carbon monoxide, and silicon fluoride; examined effect of different gases on the respiration of animals and plants, applied carbon dioxide to aerated water,

greatly improved the pneumatic trough. P.'s *Works* were ed. by J. T. Rutt, 1817-32. See the lives by T. E. Thorpe, 1906; A. Holt, 1931; and D. McKie, 1949. See also H. Pearson, *Darwin and his Circle* and *Doctor Darwin*, 1930; and Sir P. Hartog, *Joseph Priestley and his Place in the History of Science*, 1931.



JOSEPH PRIESTLEY

Engraving from a picture by Gilbert Stewart.

Prignano, Bartolommeo, see URBAN, Urban VI.

Prilep, tn in Macedonia, Yugoslavia, at the foot of Mt Babuna. It has many ancient buildings, sev. mosques, and has a large trade in tobacco, wool, and grain. Pop. 26,000.

Primage, small sum of money, over and above the freight charges, paid to the master of a ship for his care of the goods. P., which was known as 'hat-money,' is now included in the freight and retained by the shipowner.

Primary Colours, or Simple Colours, are chosen so that any other colour can be produced by mixing them in proper proportions. For pigments they are usually taken to be red, yellow, and blue. See SPECTRUM.

Primary Education, the first stage of education under the 1944 Education Act. It includes nursery schooling and continues to the age of about 11. See EDUCATION; INFANT SCHOOLS; KINDERGARTEN; NURSERY SCHOOLS.

Primate, the bishops of certain sees which anciently had attached to them the position of vicar of the holy see. They have, however, no primatial jurisdiction. In the Anglican Church the title survives

only as that of 2 archbishops: the Archbishop of York bears the title of P. of England, while the Archbishop of Canterbury is P. of All England.

Primates, term invented by Linnaeus to define the first order of the class Mammalia. By Huxley and other authorities man is included, though there are some who place him in an order apart. P. include all the apes, monkeys, and marmosets, as well as the lemurs, which bear a closer resemblance to monkeys than to any other animals, and are, therefore, agreed to belong to the order, though ranked apart as the sub-order Lemuroidea, on account of their lower organisation and inferior intelligence. The order is characterised throughout by milk and adult dentitions. As a rule, both fore and hind limbs bear 5 digits each, the thumb being usually, but not invariably, present; and, except in man, the large toe is opposable to the other toes; with the same exception, P. are mainly arboreal in habit and are confined to warm climates.

Prime, in the Rom. Catholic and Gk Churches, is an office said in the first hour after sunrise, following matins and lauds.

Prime Minister, or Premier. The P. M. or Premier, although the *de facto* head of the Cabinet and the most important personage in the kingdom, is an official unknown to the law. But in 1905 Edward VII recognised the existence of the position and gave the P. M. a definite precedence, next after the Archbishop of York. Estab. usage, however, not only clearly defines his powers and privileges and his relations with the Crown (see CABINET), but usually combines with the post that of first lord of the Treasury, foreign minister, or some other important Cabinet office, together with a privy councillorship. Walpole is generally assumed by historians to have been the first P. M.; he was not asked by the king to form a ministry, or to choose his colleagues (the 2 duties which are the constitutional authorisation for a P. M.'s assumption of office), but he entered the Cabinet at the request of George I, and gradually acquired the leadership. The office exists in some of the self-governing colonies. Nominally there is a Fr. P. M. In other continental countries the leading minister, whether called P. M. or not, does not possess the same executive power, and does not depend to the same extent on the retention of a party majority (see PARTY GOVERNMENT; PARTY SYSTEM) as the Eng. P. M.

Prime Ministers' Meetings, which, since 1937, have superseded the Imperial Conference. This latter was constituted by resolution of the Colonial Conference of 1907 to the effect that such a conference should be held every 4 years for the discussion of questions of common interest between the Brit. gov. and the gov. of the self-governing dominions. The Prime Minister of the U.K. acted as *ex-officio* president of the I. C., and the Prime Ministers of the dominions were *ex-officio* members. Except by special permission of the conferences, each discussion was

conducted by not more than 2 representatives from each gov., and each gov. had only 1 vote. The I. C. grew out of the Colonial Conferences, of which there were 4 before that of 1907—3 in London and 1 in Ottawa. At the first, held in 1887, the most prominent question was the organisation of colonial defence, and it was agreed to augment the Australasian squadron. Other questions discussed were mail services, imperial penny post, and the enforcement of colonial judgments. Trade and communications between the colonies and between the colonies and the mother country were considered at the conference held at Ottawa in 1894. It was decided to lay a cable between Canada and Australia. At the conference of 1897 imperial preference was the chief question, and imperial defence received attention, Cape Colony contributing money for a first-class battleship. In 1902 advantage was taken of the presence in London of Colonial Premiers for King Edward VII's Coronation to discuss the political and commercial relations of the Empire and its defence. Then came the Colonial Conference of 1907 (which passed the resolution mentioned at the opening of this article), in which the Prime Ministers of all the self-governing colonies took part, including the Transvaal. At this conference all the members except the U.K. reaffirmed the resolutions of the 1902 conference on preferential trade within the Empire; the U.K. was unable to admit either the necessity or the expediency of altering the fiscal system. In 1909 a Defence Conference was held in consequence of parl. discussions on the naval position, and as a result various dominions placed orders for cruisers or made financial contributions.

The first conference officially styled 'Imperial' was held in 1911, the chief questions being the constitution of the conference, inter-imperial consultation regarding treaties, migration, naturalisation, the treatment of Brit. Indians in the dominions, cable communications, and uniform treatment of Brit. shipping. A Royal Commission was appointed to report on the natural resources and trade of the Empire, and its work acted as a stimulus thereafter (see EMPIRE MARKETING BOARD; IMPERIAL INSTITUTE; IMPERIAL ECONOMIC COMMITTEE). During the First World War the I. C. was postponed (though in 1917 provision was made for the representation of India) and overseas representatives were temporarily made members of the War Cabinet (see CABINET, IMPERIAL WAR). At the Imperial War Conference of 1918, apart from confidential deliberations on the war, the most important resolutions dealt with future policy on raw materials. In 1918 representatives of all the self-governing dominions were summoned to take part in discussions in London over the peace negotiations, and in the work of the Peace Conference. A conference of Prime Ministers and representatives of the U.K. and the dominions and India was held in London in 1921 under Lloyd George.

The conference considered the foreign policy of the Empire with special reference to the League of Nations (not yet formed) and the defence of the Empire. The I. C. of 1923, at which the Irish Free State (later Eire) was first represented, agreed on the main heads of foreign policy. In that year an Imperial Economic Conference was held to consider the economic relations within the Empire and all aspects of imperial trade, including imperial preference (q.v.), overseas settlement (q.v.), co-operation in financial assistance to imperial development, the Imperial Institute (q.v.), and the estab. of an Imperial Economic Committee (q.v.). A large part of the work of the I. C. of 1926 consisted of the discussion of inter-imperial relations, which were referred to a committee of Prime Ministers and heads of delegations presided over by Lord Balfour (see INTER-IMPERIAL RELATIONS REPORT). A conference on dominion legislation and merchant shipping was held in London in 1929 (see COLONIAL LAW). Once again the subject of inter-imperial relations figured prominently in the I. C. of 1930, and discussion was renewed on the report of the conference on dominion legislation, which led to the Statute of Westminster, 1931 (see WESTMINSTER, STATUTE OF; and GOVERNOR-GENERAL). In foreign affairs the main task before the 1930 conference was world disarmament and peace. On the economic side, the conference discussed inter-imperial trade; but no statement of policy was made on behalf of the gov. of the U.K., chiefly because no policy would have satisfied the dominions which did not involve a radical change in the fiscal policy of the U.K. But by 1932 Britain had reverted to a protectionist system and concluded trade agreements with the dominion delegations which had assembled at the Imperial Economic Conference in Ottawa (see OTTAWA CONFERENCE). Advantage was taken of the presence of the Dominion Prime Ministers for the coronation of George VI to hold an I. C. in 1937. The conference adopted a revised form of the Coronation Oath in recognition of the principles underlying the Commonwealth. The conference dealt mainly with foreign affairs and defence because the international situation was rapidly deteriorating. Certain constitutional questions were raised by the S. African Gov. (see SOUTH AFRICA, UNION OF, *History*), whose chief representative, Gen. Hertzog (q.v.), sought to carry the Statute of Westminster (q.v.) beyond its implications. It was already believed by some that the I. C.s were not only too infrequent but also intrinsically unsuited to their purpose; and this view was strengthened by conditions resulting from the Second World War. Meetings of Commonwealth Prime Ministers were therefore introduced, though without formal abolition of the I. C. The first P. M. M. was held in 1944, and thereafter as follows: 1946, 1948, 1949 (at which India gave notice of her intention to assume the status of an

independent rep. within the Commonwealth), 1951, 1953 (following the Coronation of Queen Elizabeth II), 1955, 1956, and 1957. All these gatherings have taken place in London.

Prime Number, number which is indivisible without a remainder, save by itself and unity. Although 2 numbers are prime to each other when they have no common factor except unity, yet neither need be a P. N. If a P. N. divides a product of 2 or more numbers, it must divide one of the factors of that product. If a is prime to each of the numbers, b, c, d, \dots it is also prime to their product. Many properties of P. N.s are known, among them Fermat's Theorem (see NUMBERS, THEORY OF).

Primitive Land Tenure, see LAND TENURE.

Primitive, or Early Norse, Language, see NORSE LANGUAGES.

Primitive Methodism was founded in 1805 by Wm Clowes of Burslem and Hugh Bourne of Stoke-on-Trent (qq.v.). Its form of service differed from Wesleyan Methodism (q.v.) in its inclusion of singing and revivalist exhortations. The name Primitive Methodist was adopted in 1812, and, as is usual where persecution is bitter, the cause finally surmounted the many obstacles placed before it, and by 1852 the movement was well organised, not only in Great Britain but as far afield as Australia, New Zealand, S. Africa, and the U.S.A. In London, at the centre of Whitechapel, Thomas Jackson began a remarkable work of social service in the eighties of last century, particularly his 'Home for Friendless and Orphan Lads.' Primitive Methodists were reunited with the parent body in 1932 as part of the Methodist Church. See also METHODISM.

Primitive Painting, general term formerly used in the main to denote the art of the early formative years of modern European painting, beginning in Italy at the end of the 12th cent., and ending in Italy during the 15th cent. and in N. Europe some decades later. Evolving from fresco-painting, P. P. shows a concentration on line, flat colour areas, and decorative rather than strictly accurate composition, being aimed primarily at illustrating some teaching of the Church. While they had freed themselves from the stylised, artificial pattern-painting which had gone before, the primitive painters often distorted and drew out of proportion, owing to their lack of anatomical knowledge and failure to master perspective. P. P., however, was never really static: it was developing all the time towards the styles of Raphael, da Vinci, and the Van Eycks. In modern usage there has been a tendency to deprecate the application of the term to such masters as Giotto. On the other hand, 'primitive' is applied with some approval to any untutored but genuine expression, and both in France and the U.S.A. much has been made of 'modern primitives' of painting.

Primo de Rivera y Orbaneja, Marqués de Estella, Miguel (1870-1930), Sp. states-

man, b. Jerez de la Frontera, and educ. at Madrid Military Academy. He campaigned in Morocco, 1893, and in 1895 in Cuba. He was in the Philippines, 1897. After more fighting in Morocco, he became governor of Cadiz, 1915, but was deprived of this post for making a critical speech, 1916. In 1922 P. was appointed military governor of Barcelona. During the summer of 1923, he organised military revolution. His resignation was demanded; but the king, refusing to sign the Prime Minister Alhucemas's plan for suppressing the revolt, sent for P. (who had already on 13 Sept. issued a manifesto demanding dismissal of the Cabinet), and made him president of a military directorate, suspending the constitution indefinitely. P. formed the Unión Patriótica in imitation of Fascism. His greatest achievement was the solution of the Moroccan question. He conducted the retreat that ended successfully in Dec. 1924, and was followed by the victories of 1926. In 1925 he dissolved the directorate, and became Premier of a gov. into which he introduced a civilian element. This led to his unpopularity with the Army, on whom his real power depended, and in 1930 he resigned and *d.* in France. In 1947 his body was re-interred, by command of Franco, at Jerez de la Frontera.

Primogeniture, state of being the first-born child of the same parents; in Eng. law the term has become more specialised and denoted the right (abrogated in 1925) by which, on intestacy of the father, the *eldest* son or his issue succeeded to the real estate to the absolute exclusion of the younger sons and daughters (see also HEIR; TESTATE; PORTIONS; SUCCESSION). For the various forms of P. in ant. legal systems reference should be made to Maine's *Ancient Law* (chapter vii), where it is pointed out that in some ant. systems it was not always the eldest son or his issue who took up the succession, but sometimes the next brother succeeded in priority over all grandsons, especially when the succession was not to civil but to political power; and again, in polygamous societies the form of P. always tended to vary. There is no trace of the normal form of P. among the Romans, and it seems certain that it is feudal in its origin, and was the customary manner by which the huge military benefices of the Carolingian Empire were held by subfeudatories.

Primrose, Archibald Philip, see ROSEBERRY, FIFTH EARL OF.

Primrose (*Primula*), genus of herbaceous plants (family Primulaceae). The common P. (*P. vulgaris*) is one of the most cherished Brit. flowers; a number of varieties of it are grown in gardens. *P. veris* is the cowslip. The hybrid between P. and cowslip is often wrongly known as the oxlip; the true oxlip is *P. elatior*, a rare species found in the E. cos. of England. *P. farinosa* is the beautiful bird's-eye P. found growing on limestone; the leaves are mealy on the lower surface (hence *farinosa*). A number of species

of the genus are valuable garden and greenhouse plants, the interest in which is increased by the ease with which they are cross-fertilised. The auricula (*P. auricula*, dimin. of Lat. *auris*, an ear, referring to the shape of the leaves), Chinese P. (*P. sinensis*), and *P. obconica* are among the more important species from which many valuable hybrids have been derived. Botanists divide the genus into 30 sections.

Primrose League, Brit. organisation for spreading Conservative principles. It was instituted in 1833 by Lord Randolph Churchill, Sir H. D. Wolff, Col. F. Burnaby, Sir J. Gorst, and others, and is so called because the primrose was said to be the Earl of Beaconsfield's favourite flower. Its objects are 'the maintenance of religion, of the constitution of the realm, and of the unity of the British Commonwealth and Empire.'

Primulaceae, family of dicotyledonous herbaceous plants which include some of the most popular wild and garden flowers. *Anagallis*, *Androsace*, *Cyclamen*, *Dodecatheon*, *Douglasia*, *Hottonia*, *Lysimachia*, *Primula*, *Soldanella* and *Trientalis* are important genera.

Prince (Lat. *princeps*, chief), epithet applied originally to the *princeps senatus* at Rome, later adopted by the emperors from Augustus onwards. Hence it came to be used for one of the highest rank or holding the highest place and authority, and may mean the sovereign or ruler of the State. It more usually implies the son of a king or emperor, the issue of a royal family, or the head of a principality or small state. A territorial title is often attached; thus in England the eldest son of the reigning sovereign is usually created P. of Wales. Germany distinguished between the sovereign 'Prinz' and the 'Fürst,' merely one of a princely family. In Italy, as in ancient France, P.s rank next to dukes.

Prince Albert, city of Saskatchewan, Canada, on the N. Saskatchewan R. and the Canadian Pacific Railway, 100 m. N. of Saskatoon. The site of earlier fur-trade posts, the present city was founded as a presbyterian mission by the Rev. James Nisbet in 1866. It is the administrative centre of the prov. gov. for the northern areas, and a prin. terminus for transportation and communication into the forest, lake, and mining region of the N. The city has creameries, meat-packing plants, tanneries, bottling works, grain elevators, wood-working plants, and mills. It has a regional library, the Lund Wild Life Exhibit, and is 40 m. from P. A. National Park. Pop. 17,150.

Prince Albert's Regiment, see SOMERSET LIGHT INFANTRY.

Prince Charles Spaniel, see SPANIEL.

Prince Edward Island, small is. in the S. Indian Ocean, 1200 m. SE. of S. Africa. It was annexed by the S. African Gov. in Dec. 1947, the chief purpose of the annexation being the estab. of an air base as a link in Commonwealth communications in the S. hemisphere. At the same time an Australian expedition

landed on Heard Is., over 2000 m. SSE. of P. E. I., for a similar purpose.

Prince Edward Island, smallest but most densely populated prov. of Canada, lies in the Gulf of St. Lawrence and is separated from Nova Scotia and New Brunswick (S. and W.) by Northumberland Strait. It was called *Abegweit* (meaning 'Cradled on the Waves') by its earliest inhab., the Indians. The is. is 140 m. in length, varies from 4 to 34 m. in width, and has an area of 2184 sq. m. Deep bays divide it into 3 natural peninsulas, almost corresponding to the 3 cos., Prince, Queens, and Kings. The climate is mild and not subject to extremes; the mean ann. temp. is 42° F., and fogs are rare. The surface is gently undulating, with no point attaining a greater altitude than 500 ft above sea-level. The rock formation consists of a soft red sandstone. The soil, which is of a sandy loam texture, is quite fertile. Agriculture and fishing are the main industries. Mixed farming is common, the majority of the revenue being derived from potatoes, turnips, dairy products, hogs, and poultry. The is. is famous for the high quality of bacon-type hogs produced. There are 12 creameries, 5 cheese factories, 14 milk processing plants, and 4 ice-cream plants. A considerable income is obtained from egg and poultry production, also from fish, especially lobster; other fish in order of value are cod, plaice, oysters, hake, haddock, mackerel, herring, smelts, clams, and quahogs. The oysters of Malpeque Bay are renowned for their distinctive flavour. Irish moss, a product of the seashore, has recently become an important source of revenue. The fox-ranching industry was founded in P. E. I. early in the 20th cent., but it is now extinct. P. E. I.'s trade is chiefly with the other Canadian provs. Seed potatoes and fish are important exports to the U.S.A., and bacon to the U.K. A powerful ice-breaking ferry that carries automobiles, trucks, and trains plies between Port Borden and Cape Tormentine, New Brunswick (9 m.). Another ferry service for automobiles and trucks operates between Wood Is. and Caribou, Nova Scotia (14 m.). The Canadian National Railways, with several branch lines, serve the is. Airways operate from Charlottetown and Summerside, and connect at Moncton and Halifax with services to other points in the Atlantic region. Game birds include Hungarian partridge, ring-necked pheasant, ducks, geese, and snipe. The National Park along the N. shore includes excellent beaches and camping sites. Education is free, non-sectarian and compulsory between the ages of 7 and 15. Since the prov. is almost entirely rural, most of the schools (454) are of one (356) and two (61) departments. Teachers are trained at Prince of Wales College, which also provides instruction in the last two grades of high school and the first two years of univ. courses in arts and science. St. Dunstan's, a Rom. Catholic univ., is located near Charlottetown. The earliest

discovery of the is. is not satisfactorily known. Jacques Cartier visited it in 1534 and named it Isle St Jean, but it is also claimed that John Cabot sighted it in 1497. In 1603 Champlain took possession of it for France. The French made sev. attempts to settle it and to estab. fisheries. During the wars between France and England in the first part of the 18th cent. the is. was taken and retaken sev. times; finally, by the Treaty of Paris, 1763, it became a Brit. possession. In 1798 it received its present name in honour of Prince Edward, the Duke of Kent (father of Queen Victoria), then commanding the Brit. troops in N. America. Responsible gov. was estab. in 1851. The conference which paved the way for a confederation of the provs. met in Charlottetown in 1864, but the is. did not join the Dominion of Canada until 1873. By terms of the confederation the is. is represented in the Federal parliament by 4 members in the Senate and 4 in the House of Commons. Within the prov. gov. is carried out by a lieutenant-governor, an executive council, and a legislative assembly of 30 members elected by the people. The chief tns are Charlottetown, the cap., and Summerside (q.v.). Pop. 98,430. See D. C. Harvey, *The French Regime in Prince Edward Island*, 1875; J. B. Follard, *Historical Sketch of Prince Edward Island*; A. B. Warburton, *A History of Prince Edward Island*, 1923; B. Brenner, *An Island Scrap Book*, 1932.

Prince of Wales (title), see WALES, PRINCE OF.

'**Prince of Wales**,' see PACIFIC CAMPAIGN.

Prince of Wales Island: 1. See PENANG.

2. Rocky is. in Torres Strait at the N.E. of the entrance to the Gulf of Carpentaria, off Cape York Peninsula, Queensland, Australia. Area 75 sq. m.

3. Largest is. (2231 sq. m.) of Alexander Archipelago of Alaska. 135 m. long, 45 m. wide; rises to altitude of 4000 ft. It has lumbering, fishing, and canning industries.

Prince of Wales Theatre, theatre in Coventry Street, London. The original building, known as the Prince's Theatre, was built in 1883 and opened the following year. The opening programme consisted of 2 plays, Sydney Grundy's *In Honour Bound* and W. S. Gilbert's *The Palace of Truth*, the cast including Kyrie Bellew and Herbert Beerholm-Tree. In 1937 the old theatre was demolished, and Gracie Fields laid the foundation stone of the new building. Since 1942 productions have included *No Orchids for Miss Blandish*, *Diamond Lil*, and *Harvey*.

Prince of Wales's Own, see WEST YORKSHIRE REGIMENT.

Prince of Wales's Volunteers, see SOUTH LANCASHIRE REGIMENT.

Prince Rupert, seaport tn at the W. terminus of the Grand Trunk Pacific Railway (now Canadian National Railway), on Kalen Is., Port Eslington estuary, Brit. Columbia, Canada. Founded in 1909, it has since developed rapidly

and has fisheries and fish canneries, and ships, halibut, minerals, lumber, and grain. Pop. 10,381.

Princely States, Indian, see INDIAN PRINCELY STATES.

Princes Islands, now known as Kiziladalar, group of 9 is. in the E. of the Sea of Marmora, the 2 largest being Büyükdada and Heybeliada (formerly known as Prinkipo and Halki). They are about 13 m. S. of Istanbul and are celebrated for their beauty.

Princes Theatre, theatre in Shaftesbury Avenue, London. It was opened by W. and F. Melville in Dec. 1911. It was intended at that time to fill the need for a large theatre for melodrama and popular drama. Among its most successful productions have been *White Cargo*, *Bits and Pieces*, *Funny Face*, *Shepherd's Pie*, *Magic Carpet*, *Merrie England*, *The Frog*, *Monsieur Braucaire*, and numerous ballets.

Princess Elizabeth Land, Australian Antarctic Territory, see ANTARCTIC.

Princeton, bor. of Mercer co., New Jersey, U.S.A., 10 m. N.E. of Trenton. The univ. of P. owes its existence to a college founded at Elizabethtown in 1746, and moved to P. in 1756. It was then called the College of New Jersey. In 1930 it had 2000 students; in 1948 13,200. There are also a Presbyterian seminary, founded in 1812, the Rockefeller Institute for Scientific Research, and other educational institutions. Washington defeated the British here in 1777. The Continental Congress met in Nassau Hall of P. Univ. Pop. 12,230. See Hageman, *History of Princeton and its Institutions*, 1870.

Princetown, tn in Devon, England, on the fringe of Dartmoor Forest, with the highest railway station in England. The great convict prison was originally built in 1809 for Fr. prisoners, and has been used for its present purpose since 1855. Pop. 700.

Principal, see AGENT; GUARANTEE.

Pringle, Sir John (1707-82), physician, b. Stichel, Roxburghshire. He was educ. at St Andrews and Edinburgh univs., and being intended for a commercial career he continued his studies at Amsterdam. During a visit to Leyden he attended a lecture on medicine by H. Boerhaave (q.v.) and immediately determined to make medicine his career. He studied the subject at Leyden, where he was M.D., 1730, and at Paris. He settled as a physician in Edinburgh, where in 1734 he was appointed prof. of moral philosophy. In 1742 he became physician to the Karl of Stair, then in command of the British Army in Flanders. P. served through the German campaign, being present at Dettingen. In 1744 he was appointed physician-gen. to the forces in the Low Countries, and resigned his professorship at this time. He accompanied the Duke of Cumberland's forces to Scotland and was present at Culloden. P. became physician to the Queen's Household in 1761, to the Queen in 1763, and to the King in 1774. He was created baronet in 1766. He had been elected a fellow of

the Royal Society in 1745, and served as its president from 1772 to 1778. P. was the founder of modern military medicine. His *Observations on the Diseases of the Army*, 1752, laid down principles of military sanitation and ventilation of barracks, hospital ships, etc. He did much to improve the conditions of soldiers and was a pioneer in the idea of the Red Cross. His *Discourse upon some Late Improvements of the Means for Preserving the Health of Mariners*, 1776, did similar service to sailors afloat. He also wrote *Observations on the Nature and Cure of Hospital and Jail-Fevers*, 1750. A memorial by Nollekens is in Westminster Abbey. A memoir is in T. J. Pettigrew's *Medical Portrait Gallery*, vol. 2, 1840.

Pringle, Thomas (1789-1834), poet, b. Blacklaw, Teviotdale, son of a farmer. He was educ. at Edinburgh Univ. His *Autumnal Excursion*, 1816, contributed to Hogg's *Poetic Mirror*, won him Walter Scott's friendship. With Lockhart, Wilson, and others he helped to found, the *Edinburgh Monthly Magazine*, 1817 (later *Blackwood's Magazine*), editing it for some months with J. Cleghorn. Emigrating to the Cape (1820), he formed the Glen-Lynden settlement, and ed. the *South African Journal*. Returning to England (1826), he told of his experiences in *African Sketches*, 1834, which also contained the fine poems 'The Emigrants' and 'Afar in the Desert.' His earlier poems, *Ephemerides*, appeared in 1828. See ed. with life by J. Conder, 1835, and lives by L. Ritchie, 1838, and W. Hay, 1912.

Pringle-Pattison, Andrew Seth (1856-1931), philosopher, b. Edinburgh; educ. in Edinburgh and Germany. He was prof. of logic, metaphysics, and rhetoric at Cardiff, 1883; at St Andrews, 1887; at Edinburgh 1891-1919. He was Gifford lecturer at Aberdeen Univ., 1911-13, and Hibbert lecturer, 1921; Gifford lecturer at the univ. of Edinburgh, 1921-3. His works include *The Development from Kant to Hegel*, 1882; *Hegelianism and Personality*, 1887; *Two Lectures on Theism*, 1897; *Man's Place in the Cosmos*, 1897, 2nd ed., 1902; *The Philosophical Radicals and other Essays*, 1907; *The Idea of God in the Light of Recent Philosophy*, 1917; *The Idea of Immortality*, 1922; and *Studies in the Philosophy of Religion*, 1930.

Pringles, tn of Argentina, in Buenos Aires prov., 300 m. from Buenos Aires, and 70 m. N. of Bahía Blanca. It is a railway junction and stock-raising and agric. centre. Pop. 13,000.

Printing may be described as the art of taking copies by pressure from the inked surface of engraved blocks or movable type; or from incised lines on metal plates, as in engravings and etchings; from depressions, as in photogravure; or from the smooth surface of stone so treated as to reject the ink except where required (lithography).

HISTORICAL. Although we know that P. from movable type was practised in China in the 13th cent. and in Korea in the 14th, and that block P. was in use

there and in Japan some centuries earlier, yet it was not till the middle of the 15th cent. that any press was set up in Europe. In the E., from the multiplicity of the characters required, the use of type soon went out, and the Chinese reverted to block books. One hundred and forty years after movable type had been introduced in the W. it returned to China, where it had originated over 550 years before. The first book printed by Europeans in China was printed in 1590: *De missione Legatorum Japonensium ad Romanam Curiam*. The earliest undoubted date for any European woodcut block is 1423, and although there is no certain evidence for the existence of block books with both text and illustrations cut in wood before 1460, it seems most probable that the desire for some text to accompany the pictures would early lead to this method. As to who was the inventor of P. from movable type in Europe, opinions are divided, and the controversy has gone on with more or less acrimony for nearly 400 years as to whether Johann Gutenberg (q.v.) of Mainz should have the honour or Laurenz Janszoon, surnamed Coster (q.v.), of Haarlem. Neither name appears on any P. turned out at their respective presses, nor do any of the associates of either mention him as a printer or the inventor of P. In the *Cologne Chronicle*, 1498, it is said, on the authority of Ulrich Zel, a printer of Cologne, that 'this right worthy art was invented first of all in Germany at Mainz on the Rhine,' and it proceeds: 'This happened in the year of our Lord 1440, and from that time on until 1450 the art and what belongs to it was being investigated, and in the year of our Lord 1450 . . . men began to print, and the first book that was printed was the Bible in Latin [the Lat. Mazarin or 42-line Bible].'

'Although the art was invented at Mainz as regards the manner in which it is now commonly used, yet the first configuration was invented in Holland from the *Donatus* which were printed there before that time.' The chronicler continues: 'The first inventor of printing was a burgher of Mainz, and was born at Strasburg, and called Yunker Johann Gutenberg.' Junius Hadrianus in his *Bataria*, printed in 1588, states of Laurenz Coster of Haarlem that in 1440 he first cut letters from the bark of trees and printed them for the amusement of children, and afterwards used lead and tin, that a workman in his employ stole the letters and went to Mainz, and in 1441 set up a press there, and in 1442 printed the *Doctrinale* of A. Gallus and the *Tractatus* of Hispanus. From these 2 sources the controversy arose, and there is a considerable literature on the subject, notably A. van der Linde's *The Coster Legend*, 1871, *Gutenberg*, 1878, and *Geachichte der Erfindung der Buchdruckerkunst*, 1882; and Hessel's *Gutenberg: was he the Inventor of Printing?*, 1882, and *Haarlem the Birthplace of Printing*, not Mainz, 1887. The controversy continues, but the greatest weight of evidence at present is for

Gutenberg as being the first in Europe to make a practical business of P. from movable types. A form of P. press was already known, so was the necessary stiff ink; paper was available, so that Gutenberg's contribution was largely in devising a practical method of casting large numbers of identical types in a reasonable length of time. No date or name of printer appeared on any book until 1457, when the names of Fust and Schoeffer (q.v.), who had been associated with Gutenberg, appeared on the famous and beautiful *Psalter*. This magnificent vol. has initials printed in red and blue, and the craftsmanship is of a very high standard.

Cologne had some noted printers, and here the leaves began to be numbered and the 'signature' added to the first page of the sheets. Here, too, Caxton (q.v.) made his first acquaintance with the press from some printer whose name has not come down to us. Printed musical notes appeared in 1473 in Gerson's *Collectorium*. In Italy the first printers were two Germans, Sweynheym and Pannartz, who in 1464 started a press in Subiaco; before the end of the 15th cent. there were 30 Ger. printers in Italy out of a total of 40; at Venice, too, the name occurs of John of Speier in 1469. Naples and Milan, Florence and Ferrara, all had presses before 1500. It was Italy that first broke away from the Gothic form of letter that had been used by the Ger. and Dutch printers. One of the finest printers was Nicolas Jenson, whose noble roman type was the inspiration of Wm Morris's 'Golden' type, of the 'Doves Press' type, and of Bruce Rogers's 'Centaur' type. Venice produced in the 15th cent. nearly half of the books printed in Italy, and Italy with its many presses had a larger output by far than Germany, and produced finer work. The first printers in France, too, were Ger. craftsmen, Freilburger, Gering, and Krantz, who were brought to Paris in 1470 for the press at the Sorbonne, and in 1473 started their own press. In 1499 Aldus Manutius (q.v.) produced the *Dream of Polyphus*, regarded by many authorities as one of the finest illustrated books ever produced. The types used by Aldus were excellent, and a revival of one of them, now called 'Bembo,' is one of the best types for books in use to-day. Aldus was the first printer to use sloping or what is now known as italic type. In the Netherlands, Utrecht and Alost produced the earliest dated work which we know, and that as late as 1473.

The first Eng. printed book to bear a date was the *Dides or Sayings of the Philosophers* issued by Wm Caxton from his press at Westminster, 18 Nov. 1477, although, as he had been settled there for over a year, it is probable that it was not the first work printed there. During his first 3 years at Westminster Caxton printed 30 books, and in the 15 years of his life that the press was carried on by him no fewer than 100, including new eds. His first use of signatures and of spaced-

out lines was in 1479, and of woodcut blocks in 1481. At Caxton's death in 1491 the business came into the hands of Wynkyn de Worde (q.v.), who had been his foreman, and was carried on at Westminster till 1500, when he removed to Fleet Street, during which time almost all his dated books were reprints of those issued by Caxton. In all, his output during this period was no less than 100 vols. Oxford was not long behind Westminster in starting P.; there is a book supposed to be from the press of Theodorico Rood which bears date 1468, but this date is an error for 1478, caused by the dropping out of an X. In 1480 another printer, John Lettoun, set up a press in London, and was joined a few years later by Wm de Machlinia, who continued the business by himself at two addresses—'By Fletebrigge' and in Holborn. There is no direct record of the fact, but very strong evidence in support of the belief, that the business of Machlinia was taken over by Richard Pynson, who was the finest printer in England before the end of the 15th cent., his first dated book being issued in 1492. Other London printers of this period to be mentioned are Julian Notary and Jean Barbier, who were working together from 1498 to 1500, the former continuing by himself until 1520. The term *Incunabula* (q.v.) is applied to books which were printed before 1500.

From 1500 onwards it must suffice to mention a few of the printers who have done most for the advancement of the craft (see separate articles). Aldus has already been named, and after him Johann Froben of Basel (d. 1527) may be mentioned for the decorations and literary quality of his output. Paris now comes to the front with Henri Estienne, and later his son Robert, Simon Colines, and Geoffroi Tory. In Lyons there were Etienne Dolet (commenced P. 1538), Sebastian Gryphius (commenced P. 1528), and Jean de Tournes (1504-64). In Antwerp from 1560 onwards Christopher Plantin was turning out a vast quantity of books, some of them most costly productions, such as his Polyglot Bible (1568-73). The oldest print shop in Europe, and therefore in the world, is at Palma, Majorca, in the Balearic Islands. It was estab. in 1579 by Gabriel Guasp, and is still working under the management of members of the same family—the tenth generation. Very little can be said for the quality of Eng. P. in the 16th cent., though in 1559 the work from the press of John Day entitled him to be classed amongst the fine printers. Scotland had its first press in Edinburgh, and in 1507 James IV licensed Walter Chepman and Andrew Myllar to print; and the first printer in Ireland of whom there is any reliable account was Humphrey Powell, who was printing in Holborn in 1548-9, and set up in Dublin in 1550. At Oxford, where there had been no press at work since about 1476, Walter Burley was printing in 1517, and his latest book is dated 1519, and no other printer is known

there for 70 years. The earliest Cambridge date is 1521 on a book printed by John Siberch (a trans. of Lucian); it is 60 years before another Cambridge imprint is found. There were printers in Tavistock in 1525; in Bristol, 1546; Ipswich, 1548; Canterbury, 1549; Norwich, 1568; and in addition to this there were sev. secret presses in various parts of the country. The 17th cent. was a period of stagnation, if not retrogression, in the quality of P. both on the Continent and in England especially. The large family of the Elzevirs in various towns in Holland stands out prominently, however (see ELZEVIUS). In England during this period the name of Robert Barker should be mentioned as the printer of the Authorised Version of the Bible, 1611, and those of Wm and Isaac Jaggard for the

Boston was the next to have a press, in 1675, and the colony of Pennsylvania followed in 1685, but presses set up in Virginia in 1682 and in Maryland in 1685 were at once suppressed. P. in New York began in 1693. Up to the end of this century the Eng. printers had been their own typefounders in most cases, though sometimes procuring matrices and sometimes type from the Dutch. Dr Fell, at the Oxford Univ. Press, estab. a typefoundry in 1667 and helped to produce some of the finest P. in England. Fell types have been revived for occasional books in the present cent., notably for the Noncuch Press.

Wm Caslon, the greatest of Eng. typefounders of the 18th cent., cut some beautiful types in 1716, and it is probable that the type used by John Baskett (the royal printer at Oxford) in the Bible of that date, commonly known as the 'Vinegar' Bible, was from his foundry. Other printers in London in the 18th cent. were Samuel Richardson (q.v.), the novelist and bookseller, who started in 1706; Henry Woodfall and Thomas Bensley (q.v.), who began business in 1783. After 1744 Robert and Andrew Foulis of Glasgow issued some beautiful books, and John Baskerville (q.v.)—a writing master at Cambridge (1758-68) is recognised as the finest typographer of his time (he began printing in 1750), in this country at least. A revival of his type is in regular use by book printers to-day. On the Continent the two outstanding names are those of the Didots (q.v.) of Paris and Giovanni Battista Bodoni (q.v.) of Parma. There were a number of private presses started in England in the 18th cent., the most prominent among them being that of Horace Walpole at Strawberry Hill. The prin. features to be recorded of P. in the 19th cent. are the substitution of iron for wood in the P. press, and, in common with other manufs., the introduction of machinery and steam and other power and of type-setting machines; these, however, are treated of in the technical portion of this article. Of the printers, Bulmer, Bensley, and John Nichols were all three producing important works. The line of the king's printers was continued from 1770 by the ancestors of the Eyres of Eyre & Spottiswoode. Edmund Evans was the printer of Kate Greenaway's famous children's books, and also the work of Randolph Caldecott, both of which owe much to the printer for the beauty of their illustrations.

Improvements in decoration and in display of title-pages are associated with the work of Ch. Whittingham the younger; and the new designs of types and decorated pages produced by Wm Morris (q.v.) at the Kelmscott Press influenced others of the private presses (q.v.) for which beautiful types have been designed.

PRACTICAL WORK. Typography, or P. from a raised surface, is by far the most used of the 3 methods specified in the definition of P. and includes not only P. from movable type but all relief P., e.g.



A PRINTING PRESS: SEVENTEENTH CENTURY

An illustration from a page of *Spiegel van het menschelijk bedrijf*, by Jan and Caspar Luiken, Amsterdam, 1694.

folio Shakespeares of 1623. Richard Norton in 1610 issued a very fine ed. of the works of St Chrysostom. The first press in the Amer. colonies was that taken from England in 1638 by the Rev. Jesse Glover, formerly of Sutton, Surrey; Glover d. on the voyage. With the party was a locksmith, Stephen Daye, and his two sons Stephen and Matthew (who had been trained as a printer). The press was set up in a house provided by the authorities of Harvard College in the autumn of 1638, the *Whole Booke of Psalmes* being printed in 1640: a copy was sold in 1947 for £37,750. Twenty years later, following much ephemeral work by the press, the printing of the Bible in the Indian tongue was started by Samuel Green and Marmaduke Johnson, the New Testament being pub. in 1661 and the 'Ellot Indian Bible' 2 years later, a first ed. of which was sold in 1955 for £3700.

stereotypes (q.v.), or type-metal casts produced from moulds of plaster or flong of whole pages of type or other matter; electrotype, or copper shells backed with metal, produced from electrical deposit upon moulds of plastic or wax taken from type, woodcuts, or line or half-tone blocks. Typefounding is described under TYPE AND TYPEFOUNDING; electrotyping under METALLURGY; line and half-tone blocks under PROCESS WORK; see also WOODCUTS and WOOD ENGRAVING.

COMPOSITION. Composition by hand only is here considered; that by machine is treated in a separate article—TYPE-CASTING AND TYPE-SETTING MACHINES. In practice, only small jobbing work is hand-set to-day. All continuous reading matter of any length is always set on a machine which may cast types singly ('Monotype') or in lines ('Linotype,' 'Intertype'). Machines for substitution of type by the photographic film are well developed (see FILM-SETTING). For hand-setting each character must, of course, have its own place, and for this purpose each fount needs 2 cases, or trays, divided by partitions into separate boxes, one for each character. With very small founts one tray, called a 'double case,' is sufficient. These cases lie on the top of the composing frame at about breast height, sloping upwards towards the back. These are the cases for immediate use; beneath there is a rack to hold other pairs of cases. The upper case contains all the capitals, small capitals, figures, and accented letters. The lower case, because of the varying frequency of occurrence of the different letters, and the greater aggregate of them used, has boxes of varying size. (From this arrangement are derived 2 phrases in the printer's terminology: 'upper case' refers to capitals, and 'lower case' to small letters.) There are 4 different sizes: the largest, of which there is only one, is for e, which is 6 times the size of the boxes in the upper case; then there are 14 two-thirds its size, 11 one-third, and 26 one-sixth. This case contains all the small letters except k and the accented ones, and the punctuation marks, quadrats, spaces, and &, and double letters like ff, fl, fi, and the boxes are so arranged that the larger and more frequently used ones are together in the middle of the case. Type is set by a compositor who takes each letter and space in turn out of its box and places it in a small adjustable tray, known as a composing stick. The ordinary stick used in book and jobbing work is of metal, with the left end adjustable by a screw or spring fastening, so that the measures may be altered to the length of line to be set. In beginning a paragraph an em quadrat, or space the size of the letter M, is often placed in the stick against a setting rule to the extreme left and held by the thumb to form the indentation; then the types, letter by letter, of the first word are taken from their boxes and placed in the stick as they are picked up. As each word is set a space is put in (except, of course, at the end of a line), generally a thick (or 1

em), and when the last word that the line will hold has been set, if that does not fill out the line and the next word cannot be divided, the line will require justification, that is, alteration of the space between words to accommodate the word in question. If the work is not to be set solid, that is, each line of type close up to the one above it, a thin strip of lead is inserted between the lines. In emptying the stick the compositor uses a lead which is sometimes placed in the stick before the first line is set. Between this lead and the setting rule the lines are lifted by using the thumb and first finger of both hands at the lead and setting rule respectively, the type being steadied on the sides by the bent fingers of each hand. It is then placed or 'dropped' on to the galley, which is a flat tray with 3 raised sides made sometimes of wood, but mostly of metal; in this and on a special press a galley proof is generally pulled for first reading. In the case of long books or books which have special problems of layout, such as the insertion of illustrations in the text, or are likely to be heavily corrected, the editor, author, or publisher may require to see proofs at this stage (for marking of proofs see PROOF-READING).

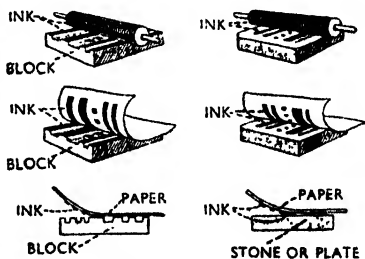
The type, corrected, is now made up in page form, with headlines and page numbers added. When the number of pages will complete one sheet are ready they need to be imposed, or arranged in such relation to one another that when printed the sheets may fold with the pages appearing in their correct order. This having been done, the whole requires the insertion of furniture (wooden or metal strips) between and around the pages to form the margins. The pages are then locked up in a chase or iron frame with bars across it to give security to the forme. When the furniture is in position the type is held firm inside the chase by means of wedges known as quoins. Before the quoins are tightened the planer is used to ensure for the type an even surface, which it would not have if some letters were not standing on their feet. The planer is a block of wood about 1 in. thick, and about 6 in. by 8 in., which is placed on the face of the type and gently struck with a mallet. A first page proof is now pulled and the corrections made. After printing, the type may be returned to the composing room for distribution, i.e. return to the cases, if it is desired to preserve it.

The practice of bookwork applies also to jobbing and news work, and where there is any difference it will now be mentioned. The term 'jobbing work' is applied chiefly to cards, circulars, invoices, handbills, and other small work, as well as to posters, and to a very large extent consists of displayed work. The differences between the operations of the newspaper office and those which have been described are that a much larger proportion of the composition is done by mechanical means (see TYPE-CASTING AND TYPE-SETTING MACHINES), and there is

very little distribution, the type being melted down and the metal used again; and the fact that when the ordinary movable type is used it is not printed from direct, but stereotyped plates are made, either flat or, more frequently, cast in semicircular form, for attachment to the type cylinders of rotary presses (see STEREOTYPING).

PRESS AND MACHINE WORK. For the best part of 400 years after the invention of P. in Europe the same style of wooden press was in use, with only minor improvements, and these chiefly in Holland. It was a screw press, made entirely of wood, except that the bed upon which the forme lay was of stone, contained in the carriage or 'coffin.' It was in 1800 that the first iron press was invented by Karl Stanhope; in this the chief improvement, beyond the fact of its being of iron and therefore more rigid and less clumsy, was the use of levers in addition to the screw. The same structural form, however, still persists, which may be described as a vertical frame, standing on 4 feet and supporting a platen made to rise and fall at will by the use of a horizontal bar. Horizontal runners or ribs are fixed to the bottom of this frame, supported at the other end by one leg, with a carriage travelling upon them, forming the bed of the press, and bearing upon it the forme, which is drawn out for inking, and placing the sheet, and returned beneath the platen to receive the impression. The movement of the carriage is effected by a winch arrangement. The platen, which is supported on a strong spring contained in a box at the head of the press, is forced down by a piece of steel, called a chill, being brought to a vertical from a sloping position by means of a lever actuated by the pulling over of the handle bar, the recoil of the spring carrying back the platen to its former position on the return of the handle bar. Two adjuncts of the press have yet to be described: the tympan and frisket. The former is fixed with detachable hinges to the carriage at the end farthest from the platen when the carriage is run out, and consists of 2 iron frames, each covered with parchment or blanket stretched tightly, one being made to fit within the other, so that they are flush in thickness, the larger one being of the same size as the bed of the press. The two frames are fastened together by hooks on the larger one, with studs on the smaller, and the parchments on both are on the lower side, between which a few sheets of paper are interposed for the purpose of equalising and taking off the hardness of the impression. When the tympan is fixed to the carriage as described and turned upon its hinges, it is upon the inner side that the paper to be printed is laid. The frisket serves to hold the paper in its place when the tympan is lowered on to the forme, and to prevent any ink that may have got on to the furniture or chase from reaching the paper; it consists of an iron frame, slightly smaller than the outer frame of the tympan, to which it is attached in

the same way as that is to the carriage. A sheet of strong paper is pasted on to the frisket in the same way as the parchment is to the tympan, and this paper is cut away in those places where it would fall upon the type, a framework of paper being thus left to support and protect the margins of the sheet to be printed. Ink tables are mostly made of iron and fixed to the floor. They are of 2 sorts: one has a cylinder with crank handle to give out the ink from a receptacle behind it; with the other a brayer, a wooden implement in the form of a short, broad cylinder, with an upright handle at the top, is used to rub out the ink as needed. Inking balls with a handle at the top were used in the old days for beating the ink upon the type, but at the present day rollers are used; they are made of a composition which includes glue and treacle; and are cast or moulded around a wooden spindle, and revolve in an iron frame with upright handles, or a single handle in the case of short ones. (For ink see under INK.) Nowadays, these hand presses are only used for making proofs, but in the past 2 men generally worked together at a press, one rolling and one pulling, and about 250 impressions in the hour was the usual speed. This is after making ready and overlaying, which are processes that have to be described here, though the same operations occur with machine P. Making ready, on both press and machine, is bringing up the type to an absolute level, or, more accurately, making the impression equal for the whole forme, and this is effected for the most



THE PRINCIPLE OF LETTERPRESS OR RELIEF PRINTING (left) COMPARED WITH LITHOGRAPHIC (SURFACE OR PLANOGRAPHIC) PRINTING (right)

A block is shown for the purpose of illustration: the principle applies equally to a line of type.

part by varying the number of thicknesses of paper within the tympan. The basic reason for inequality of impression in type is (a) inequality of surface of the bed of the printing machine, and (b) the variation in pressure received by characters with a printing surface which is small (e.g. a full point) and those with a large surface (e.g. the letter m). The Letouzey

method of printing reduces make-ready by employing type cast with minute differences in height; e.g. m has a longer shank than the full point. Overlaying applies to woodcuts and line or tone blocks, and is on the same principle as making ready a type forme, but is much finer work, and its object is the reverse, namely to give a heavier impression on some parts of the block than on others. Half-tone blocks do not require the same amount of overlaying as woodcuts, as a finer gradation of tone is natural to them, nor must the overlays be so thick or of so hard a paper.

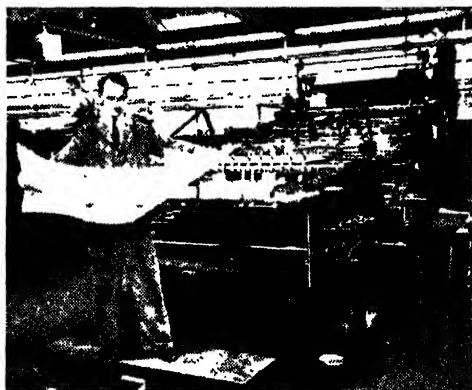
The smaller platen machines are sometimes worked by treadle; the larger machines, whether platen, cylinder, or rotary, are power driven. It is intended here

each impression, the inking rollers travel downwards across the inking table and over the forme, returning as the platen again approaches the forme. The making ready is upon the same principle as in the hand-press; and this holds good with machines of the various sorts. With the class of machine above described a lad can lay on and take off 1000 per hour with a treadle machine, or more with power.

The first P. machine with a cylinder was patented by Joseph Adkin, his son, and Thos Walker in 1772; no machine was built. In 1790 Wm Nicholson also took out a patent for a cylinder machine. It was this principle that Koenig developed in 1811, the resultant machine with 2 cylinders being erected in *The Times* office 3 years later. Cylinder machines



THE COMPOSITOR AND THE PRINTER



Left. The compositor is preparing a small forme for jobbing work. *Right.* The printer is examining the first sheet ('Quad Demy') run from a flat-bed machine after completion of make-ready.

to give a general idea of the principles on which they are constructed. P. machines may be divided into 3 classes: platen machines, in which both the P. surface and the impression surface is flat; cylinder machines, in which the P. surface is flat and the impression surface cylindrical; and rotary, in which both surfaces are cylindrical. The principle of the smaller platen machines is as follows: they have a vertical coffin facing the operator, upon which the forme is fixed by clamps on a special chase. The platen, when the sheet is laid on, is nearly horizontal and immediately in front of the operator, being supported by two arms, by which in working it is carried down to face the forme; its position whilst travelling gradually assumes the vertical, and on arriving at this position the impression takes place. The impression is regulated by one or more screws, or, in some makes, wedges, at the back of the platen. As the platen returns to position for laying on after

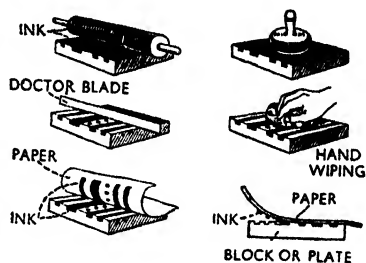
may be classified as follows: flat-bed machines and rotary. Of the flat-bed machines the simplest form is that with one cylinder, which prints only one side of the paper. In this form the cylinder is placed across the machine about midway of its length, with the ink duct and ink-distributing arrangement at one end, and the inking rollers between these and the cylinder and close to the latter, the other end being occupied by the laying-on board. Beneath the whole of this the bed travels with the inking table attached, so that at the time the ink table is receiving the ink from the distributor the forme has just passed under the inking rollers, the grippers on the cylinder have opened to release the sheet just printed, and a fresh sheet has been laid in; on the return journey the type again passes under the rollers, followed by the table supplying fresh ink to the rollers, and the cylinder has revolved with the paper around it over the type. Of this class of machine there are 2 main types: the stop-cylinder,

in which the cylinder remains stationary when the impression is not being made; and the 2-revolution, in which the cylinder always rotates; of which again there are 2 types—one makes a second revolution in the same direction during the return of the forme-carriage; the other, which is a two-feeder, has inking arrangements at each end, and the cylinder, instead of continuing to revolve in one direction, reverses with the reversal of the direction in which the forme carriage is travelling.

A two-colour machine is usually of the flat-bed kind, but in this case there are two formes—1 colour at one end, and 1 at the other. As it carries the same sheet for the 2 revolutions it is only a single feeder. The 2-cylinder machines print both sides of the sheet at separate impressions before delivering it, and so are called 'perfecting' machines. They also have an inking arrangement at each end, besides the 2 formes. Like the 2-revolution single-cylinder machines, they are fed from above the cylinder and not below as with the stop-cylinder. In a certain type the sheet when fed in is carried by tapes around the first cylinder, where it receives the first impression; thence it is carried around 2 smaller drums placed between the 2 cylinders and on a higher level which lead it to the second cylinder, reversed for receiving the second impression. In another and more modern type the sheet is fed into grippers and transferred direct to grippers on the second cylinder. All these machines are fitted with automatic arrangements for delivery, which vary with various makes, and all can be fitted with automatic machinery for feeding the sheets. By means of a circular knife the sheet may be delivered cut into two for convenience in the folding operation to follow (see BOOKBINDING). In two main respects rotary machines are entirely different from other P. machines. In the first place, besides impression cylinders they have type cylinders, which is somewhat of a misnomer, as it would hardly be practicable to lock up type in a cylindrical forme; therefore they use stereotype plates in place of type. The type is set most often by machinery and locked up in the ordinary way, then a mould is taken in fong (see PAPER); this can easily be bent for casting from, so that it will fit on to the cylinder. The other difference is in the paper, which is fed in from reels instead of separate sheets, though some rotary machines are adaptable on occasion for single-sheet feeding. These are all perfecting machines, and are chiefly in use in newspaper offices. They not only print on both sides of the paper, but cut, fold, and, when required, paste and deliver in bundles of a predetermined number. Many magazines, whether illustrated or not, are printed on rotary machines, being folded, the sections inserted in the correct sequence, and wire stitched, in some cases into a wrapper, printed in 1 or 2 colours (see PHOTOGRAPHURE; G. A. Isaacs, *The Story of the Newspaper Printing Press*, 1931).

Intaglio and Photographic Processes. It remains to describe the P. processes and machinery used for the making of engraved or intaglio plates (see ENGRAVING), and for flat-surface (planographic) P., as in lithography.

The method employed in the P. of intaglio plates of all sorts is to dab the ink well into all the work on the plate, then to wipe the surface with a rag, and to polish it with the ball of the thumb. The paper is placed on the face of the plate on the table of the press and covered with a blanket, and the table drawn through between the 2 iron rollers. The P. of coloured engravings by this method is necessarily a slow one, as all the colours have to be, as it were, painted on to the plate for every copy printed, although attempts have been made to print each colour from a separate plate. Besides the ordinary copper-plate press, mentioned above, there are machines, both flat-bed and rotary, which work at far greater



THE PRINCIPLE OF INTAGLIO PRINTING (top), plate inked all over; (middle), ink wiped off surface; (bottom), print.

speed, and with which the inking, wiping, and P. are all done mechanically (see also PHOTOGRAPHURE). In some of the rotary machines the ink is scraped from the surface of the plate by a 'doctor' blade instead of being wiped off; in all cases, however, the ink has to be worked into the incised lines of the plate and the face of the plate cleaned before each fresh copy is printed (see further under PHOTOGRAPHURE). Lithography is the process of drawing upon and P. from stone. The principles upon which the process is based are the antagonism of grease and water, the disposition of greasy substances to adhere to one another, and the property of absorption possessed by calcareous stones. A chemically pure surface is covered in the portions it is intended to print with a greasy composition (i.e. has a drawing, etc., made on it), and the rest of the surface is moistened, so that the application of a greasy roller causes the resistance of the wet portion, but not of the greasy part, and an impression can readily be taken from the surface when treated in this manner. This process can

also be carried out mechanically, zinc plates with a grained or roughened surface taking the place of the stone. These can be buckled round the cylinder of a litho printing press. Collotype (q.v.) is allied to lithography. Offset P. is the latest development of planographic P. In this process the P. surface is rubber, either a flat sheet or mounted on a cylinder. Upon this an impression is taken from a litho stone, from type, or from an engraved plate in a lithographic ink, so that work produced by any of these classes may be printed by transferring the ink to the rubber, and thence to the paper. Offset P. and the basic parent process are described in detail in the article LITHOGRAPHY.

Correction of Proofs. See PROOF-READER; PROOF-READING.

See also CALICO PRINTING; COLOUR PRINTING; FILM-SETTING; ILLUSTRATION; INCUNABULA; LITHOGRAPHY; PHOTOGRAPHURE; PRIVATE PRESSES; PROCESS WORK; SCREEN PROCESS PRINTING; STEREOTYPING; TYPE AND TYPEFOUNDING; TYPE-CASTING AND TYPE-SETTING MACHINES; TYPOGRAPHY.

See E. C. Bigmore and G. L. H. Wyman, *A Bibliography of Printing, with Notes and Illustrations*, 1880-8; T. Jacobl, *Printing*, 5th ed. 1810; T. L. de Vinne, *The Practice of Typography*, 1914; S. Morison and N. Jackson, *A Brief Survey of Printing*, 1923; S. Morison, *The Art of the Printer*, 1925, *Type Designs of Past and Present*, 1926, and *The Typographic Arts*, 1949; (i. Winship, *Gutenberg to Plantin (an outline of the early history of printing, 1450-1600)*, 1926; R. A. Peddie, *Printing; a Short History of the Art*, 1927; O. Simon and J. Rodenberg, *Printing of To-day*, 1928; A. F. Johnson, *Type Designs*, 1934; D. B. Updike, *Printing Types*, 1937; H. Jackson, *The Printing of Books*, 1938; J. C. Tarr, *How to Plan Print*, 1938; E. Gill, *Essay on Typography*, 1940; P. Simpson, *Proof-reading in the XVIIth, XVIIIth, and XIXth Centuries*, 1948; F. Meynell, *English Printed Books*, 1948; H. Curwen and J. Brough, *What is Printing?*, 1948; G. H. Aldis, *The Printed Book*, 1949; J. W. Forsaith, *Organisation and Management for Master Printers*, 1949; J. R. Biggs, *An Approach to Type*, 1949; K. Ullyet, *Pictorial Printing Processes*, 1949; S. H. Steinberg, *Five Hundred Years of Printing*, 1955; and the periodicals *Monotype Recorder*, *British Printer*, *Printing Review*, and *Penrose Annual*.

Printing Ink, see INK.

Prior, Matthew (1664-1721), poet and diplomatist, b. Wimborne Minister, Dorset, son of a joiner. He attracted the attention of the Earl of Dorset, and was educ. at Westminster School and St John's College, Cambridge, of which he became a fellow in 1688. Through the influence of the earl P. was appointed in 1690 secretary to Lord Dursley (later Earl of Berkeley), Eng. ambas. at The Hague; P. acted in the negotiations for the treaty of Ryswick (1697), and was under-secretary of state in England (1699). In 1700 he entered Parliament as a Whig, but

joined the Tories in 1701. He was commissioner of customs from 1711 to 1714, and ambas. at Paris in 1713, and was imprisoned by the Whigs (1715-17) on their return to power. After his release he lived in retirement on the proceeds of his writing and with the help of friends, in particular Lord Harley. His poetry is contained in the various eds. of his *Poems on Several Occasions*, the chief collection being that of 1719. His attempt to write Pindaric odes, as illustrated by his *Carmen Seculare*, 1700, a panegyric on William III, met with no real success, and his odes in bulk are not usually reckoned among his best efforts. *The Hind and the Panther Transvers'd to the Story of the Country Mouse and the City Mouse*, written in 1687 in collaboration with his friend Charles Montagu, is a travesty of Dryden's *Hind and the Panther*. *Alma*, written in prison in imitation of Butler's *Hudibras*, is a humorous speculative poem on the relations of body and soul.

P. is, however, remembered less for these and similar works, such as *Solomon*, 1718, *Henry and Emma*, c. 1701, and *English Ballad on the Taking of Namur*, 1695, than for light occasional verse in the vein of Herrick. There is sincerity and wit in many of his short poems, such as 'The Lady's Looking-glass,' 'On my Birthday,' 'For my own Monument,' 'The Question to Lisetta,' 'A Song,' 'Hans Carvel,' 'To a Child of Quality,' 'The Secretary,' and 'Jimmy the Just' (first given to the world in A. R. Waller's ed. of the *Poems*, 1905-7). Mostly these are pieces of ironical or sensual badinage, depending for effect on wit and the exact suitability of form. His *Two Imitations of Chaucer* show that he has some of his predecessor's sly humour, and his 2 epistles *To Fleetwood Shepherd* are cleverly and wittily phrased. His tales are of a Restoration coarseness, but in their author 'we at last reach an English poet who can manage the mechanism of a conte as well as the most skilful Frenchman' (Gosse). His epigrams are particularly fine. See eds. by A. Dobson, 1889; R. B. Johnson, 1892. See also W. M. Thackeray, *English Humourists*, 1853; A. Dobson, *Eighteenth Century Vignettes* (3rd series), 1896; life by F. Bickley, 1914; and studies by C. W. Legg, 1921, and C. K. Eves, 1940.

Priority, preference in obtaining labour or materials in short supply. The word acquired this special application during the Second World War, and the system of P.s put into operation depended for its effectiveness on the setting up of controls. The P.s Div. of the Board of Trade was formed to deal with the business of obtaining labour, fuel, materials, and capacity for civilian productions (home and export) and to allocate, by arrangement with the Controls, certain raw materials for those purposes, notably steel and timber. In relation to the rationing system commodities for which P.s were laid down included petrol, milk, bananas, etc., among those given P. being doctors (petrol) and young children (milk, bananas).

In its legal use the word has sev. appli-
cations, e.g. as among creditors against a
debtor or insolvent where the estate of the
debtor is insufficient to meet all claims
(see COMPANY AND COMPANY LAW;
DEBT).

Priory, community of monks or nuns,
governed by a prior or prioress. The
introduction of P.s dates from about the
end of the 13th cent. In most cases they
are dependent upon abbeys, to which they
are finally responsible.

Pripet (Russian *Pripyat'*, Belorussian
and Polish *Prypiec*), navigable riv. in S.
Belorussia and NW. Ukraine, right trib.
of the Dnieper, which it joins near Kiev.
Length 500 m. P. flows through a marshy
area (P. Marshes, see POLES'YE) which
was the scene of much fighting in both
world wars.

Prishvin, Mikhail (1873-1954), Russian
writer, agronomist by profession, a
passionate naturalist and ethnographer.
In his works (*In the Land of Unfrightened
Birds*, 1907; *The Calendar of Nature*,
1923; *The Springs of Berendey*, 1925;
Root of Life, 1932; *Tree Drappings*, 1940;
The Larder of the Sun, 1943; autobio-
graphical novel *The Chain of Kashchey*,
1930) he combined masterful description
of nature and life with a subtle message
of the ethics of love and creativeness.

Prism, solid figure of which the 2 ends
are similar, equal, and parallel rectilinear
figures, the other faces being parallelo-
grams. In optics the term is usually
applied to a triangular geometrical prism,
the refracting surfaces of which are in-
clined at acute angles. The volume of a
P. is found by multiplying the area of the
base by the vertical height.

Prismatic Sulphur, monoclinic crystal-
line form of sulphur obtained by melting
the ordinary form and allowing the liquid
to crystallise. It is unstable at ordinary
temps. and soon changes back to the com-
mon variety.

Prisoners of War. A prisoner of war
may be defined as a public enemy armed
or attached to the hostile army for active
aid who has fallen into the hands of the
captor whether by individual surrender or
capitulation. In ancient times P. of W.
could be and were killed, unless the
belligerents found it more profitable to
exchange them or liberate them for
ransom. For long, indeed, there were no
generally accepted rules regulating the
position and fate of P. of W., and it is
only within comparatively recent years
that definite regulations have been estab.
The existing law on the subject is based
on Convention IV of the Hague Con-
ference of 1907, which conference adopted,
with certain changes, the rules made by
the Hague Conference of 1864, and the
articles relating to P. of W. contained in
the Geneva Convention of 1906. This
was somewhat extended in the Geneva
Convention of 1929, when delegates of
47 nations met at Geneva and ratified a
further agreement on the treatment of
P. of W. There was further revision in
1949. Under the existing regulations, P.
of W. must be humanely treated, pro-

tected from violence, and subjected to no
reprisals. They must be supplied with
reasonable nourishment, medical and
sanitary facilities must be provided, and
the P. of W. are regarded as being in the
power not of their actual captors, but in
that of the gov. of the captor. All their
personal belongings remain their own, with
the exception of arms, horses, and military
papers (these constituting booty, q.v.).
They may be detained in a fortress, camp,
tn, or anywhere else except a convict
prison, and may be kept within fixed
boundaries. One the of prin. changes
made in 1907 was in regard to forced
labour. The State may utilise the labour
of P. of W. other than officers, but it was
only in 1907 that it was decided to ex-
clude officers, though the Japanese had
previously abstained from imposing forced
labour on Russian officers in 1904-5.
But in proper cases, those who are put to
work must be paid according to rank and
ability. Their tasks must not, however,
be excessive and must not relate to mili-
tary operations. Officers are paid the
same as those of equivalent rank in the
forces of the power capturing them. It
is the duty of officers to make all reason-
able attempts to escape, provided they
have not given parole, but they may be
punished if recaptured. Every prisoner
of war, if questioned, must declare his
true name and rank or render himself
liable to the loss of the advantages given
to P. of W. of his class, but he need not
give any other information. The ex-
change of prisoners is effected in accord-
ance with agreements called *cartels*, in
which the time, place, and method of
exchange are fully detailed. The basis
of exchange is generally that of strict
equivalents, man for man, rank for rank,
disability for disability. Certain non-
combatants, such as doctors, medical
orderlies, and padres, may claim repatri-
ation. A parole is a promise, either verbal
or written, given by an officer to secure
greater freedom of movement or to obtain
special privileges or advantages while held
as a prisoner of war. The officer giving
the parole pledges his honour to pursue or
refrain from pursuing a particular course
of conduct, and a breach of this guarantee
of good faith may involve the extreme
penalty if the paroled prisoner be captured
in arms before he has been regularly
exchanged. The Convention of 1929 also
allowed for information bureaux in the
belligerent countries to circulate infor-
mation about P. of W. During the war,
a neutral power should safeguard P. of
W.'s interests: the representatives of this
power may visit P. of W. camps and
question prisoners. The rules outlined
above have no application to captured
spies. The allegations made against
Germany about her treatment of Brit. P. of
W. during the First World War were
widely pub., and undoubtedly the con-
ditions under which the prisoners lived
were not entirely unavoidable or excus-
able. But Germany, also, brought charges
against other allied powers in regard to
Ger. P. of W., and though Great Britain

observed the Hague regulations, the observance of these regulations by some of the belligerents left much to be desired (see R. F. Roxburgh, *The Prisoners of War Information Bureau in London*, 1915, in regard to the working of that bureau during the First World War).

The judgment in the Nuremberg trial (q.v.) showed that in the Second World War the political and military heads of the Ger. Gov. and Wehrmacht and their subordinates subjected P. of W. to extremely bad treatment on a number of occasions. These included the shooting of 50 R.A.F. officers in Mar. 1944. These men had escaped from the P. of W. camp at Sagan, near Breslau (Wrocław), and were shot on recapture on the direct orders of Hitler. It was not even contended by the defendants in the Nuremberg trial that this was other than murder, in complete violation of international law. With certain notable exceptions, however, Germany on the whole observed the Geneva Convention with Brit. P. of W.: but Fr. prisoners were often ill-treated and Polish and Russian P. of W. were subjected to extreme brutality, some Soviet P. of W. being made the subject of medical experiments of the most cruel kind. Japan broke all conventions, employing P. of W. as unpaid coolie labour and using torture to extract information or as the punishment for trivial offences. Japan was one of the non-signatories of the Geneva Convention, as was the Soviet Union: and Soviet treatment of Finnish, Polish, and Ger. P. of W. during the Second World War has been harshly criticised as inhuman and lacking moral justification. In 1945 the Nobel peace prize was awarded to the International Red Cross Committee for its work done on behalf of P. of W. of all nationalities during the Second World War. In 1946 and 1947 sev. meetings were held at Geneva, organised by the International Red Cross, to consider revision of the clauses of the 1929 convention which affected P. of W. A new Geneva Convention was signed in 1949 (see further RED CROSS). See P. des Gouttes, *Commentaire de la Convention de Genève du 27 juillet 1929*, 1930; F. W. Heinemann, *Das Kriegsgefangenenrecht in Landkrieg*, 1931; W. S. Flory, *Prisoners of War*, 1940; A. R. Werner, *La Croix-Rouge et les Conventions de Genève*, 1943; and J. Cazeneuve, *Essai sur la psychologie du prisonnier de guerre*, 1944.

Prisons. The idea of using P. as places of punishment is comparatively recent. Well into the 19th cent. the punishment for all felonies was death and, for misdemeanours, fines, whipping, the pillory, or the stocks. P. were used in the first instance for safe custody and for assisting the Crown to exact its fines, whilst the bridewells were intended to provide work for the unemployed and those who refused to work. During the 18th cent. the distinction between these 2 types of jails was largely obliterated. The jails of that period and the first part of the 19th cent. were morally degrading and

utterly insanitary, and it was against these conditions that first John Howard and later Elizabeth Fry (q.v.) agitated.

The jails were generally run for private profit, and in so far as there was supervision it was the responsibility of the justices and the local authorities. The State was responsible for the convicts. Convicted felons who were not put to death were deported to the colonies. As this became increasingly difficult alternatives had to be found.

The first Act authorising State penitentiaries was passed in 1779 after the loss of the Amer. colonies. Only 1 institution, Millbank prison, was set up under this Act, in 1821. With the ending of transportation to Australasia in the middle of the century the need for more convict P. was intensified. Pentonville, the 'model prison,' was built in 1842, and during the following 6 years 54 other convict P. were built on the same plan. Practically all the closed P. in use to-day date from this period.

Penal servitude involved a sentence ranging from 3 years to life. All shorter sentences were served in the local P., which at first remained under the control of the local authorities. In 1877 all P. were centralised under a Board of Prison Commissioners, though the term 'local prisons' still remains in use.

The design of the 19th-cent. prison was based on the belief in the virtue of separate confinement. Partly this was a reaction against the lack of segregation of the early P., partly the result of a genuine conviction as to the moral value of solitary meditation. Work in them, typified by the treadmill, was exhausting and, of set purpose, without practical utility. By the end of the century doubts were beginning to be felt about this system. A royal commission was accordingly appointed. Its report was pub. in 1895 and was followed by the Prison Act of 1898. It vigorously condemned the existing system for its demoralising effects. The commission considered that the aim of a prison system should be 'to awaken the higher susceptibilities of prisoners... and whenever possible turn them out better men and women physically and morally than when they came in.' This statement brought to the fore the fundamental question of the purpose of P. Should they aim primarily at deterring the potential criminal through fear of a prison sentence or at reforming the prisoner? The modern point of view is that in so far as fear of punishment can prevent crime, the shame of imprisonment, the loss of liberty, and separation from all home ties provide as effective deterrents as can be devised. The material conditions of prison life, however unpleasant, do not add anything to its deterrent value. Their nature may, however, easily add to or detract from its reformatory value. Though the reformatory aim is to-day wholly accepted in theory, in practice a certain duality of purpose still remains. The old buildings still create an atmosphere of repression,

and having been built for deterrence can only be partially adapted to a reformatory process. Inadequate space makes vigorous exercise impossible. It frequently prevents the provision of really good workshops and hampers the introduction of other activities that would be valuable for training.

Developments in the prison regime have for the most part come about through administrative changes, but the Criminal Justice Act, 1948, simplified the system by abolishing the first and second divisions in P. and abolishing hard labour and penal servitude.

These changes were more apparent than real. Sentences in the first and second division were rarely given, and hard labour had ceased to be anything but a name. At the beginning of the present century the first 28 days of a sentence of hard labour were spent working alone in the cell, but it was found this meant that the hard-labour prisoner worked less hard than others. The period of solitary confinement was reduced to a fortnight in 1922 and then abolished. The only distinction left between hard labour and imprisonment was that for the first fortnight the hard-labour prisoner slept on a bed without a mattress. Even this distinction was done away with during the last war, so that by 1948 the term 'hard labour' was meaningless.

There had at first been considerable differences in the regime of the convict P. and the local P., but these, too, were gradually abolished until the treatment of the inmates of the 2 types of institution became almost identical, and some convicts actually served their sentence in the local P. Solitary confinement for convicts, which had been reduced to the first 3 months after 1898, was abolished in 1922. During the first quarter of this century improvements were steadily introduced in all types of prisons. Work in association became the rule, and meals in association were allowed after a certain length of sentence had been served. But it was still true that there was little positive training, since nothing was left to individual initiative or individual responsibility. Then an experiment of great importance was tried when special training for selected prisoners was introduced at Wakefield, with more responsibility, more freedom within the prison, and with a more vigorous regime. This was followed up in 1936 by the opening of a camp some m. from Wakefield (New Hall Camp) where selected prisoners live in open conditions. This was the first 'prison without bars.' The belief that lies behind this development is that prisoners cannot be trained to make good use of liberty if they are denied all freedom of choice and all responsibility. It is not intended that life in the open P. should be easier than in the old P. Actually it is more vigorous and makes more demands on the prisoners both physically and mentally.

The Second World War for the time

stopped further developments along these lines, but much has been done since. The Prison Commission's Report for 1954 listed 5 'training prisons' for selected male prisoners, with sentences of not less than 18 months, and 2 for women. These may be open, or P. of medium security, i.e. P. in which there is considerable freedom of movement within a closed perimeter, or closed P. in the case of Wakefield and Maidstone, though each of these has an open camp attached. There is 1 open prison at Leyhill for 'stars' (i.e. first offenders) with long sentences and 5 open P. for 'stars' and 'ordinaries' with shorter sentences, the 'stars' being in the majority.

All prisoners go in the first instance to a closed prison and are transferred to a training or open prison only if they appear suitable. It is not possible to ascertain from the official reports the exact number in these P. It would seem to be about 16 per cent of the total.

Wakefield was not only the first 'training prison,' it was also the first prison where the experiment of paying wages was tried out. This so clearly improved both the work and the morale of the prisoners that it became the rule. At first wages were only paid after one month's sentence had been served, but since 1949 they are paid from the beginning of the sentence. The amounts, though raised at various times, still remain small. A man who is not a skilled workman may earn about 3s. a week. In some of the continental countries earnings are much higher than here, and part of the earnings are set aside for the prisoner on discharge.

Whilst wages may provide an incentive to good work, an even greater incentive is interesting work. Here prison work largely fails. Few of the workshops are well equipped. In 1954 about one-quarter of all prisoners available for work were engaged in making or repairing mail bags. A very small number are given vocational training in certain trades, and a small number go out to work in occupations where there is a shortage of local labour, mostly in agriculture. In 1954 this latter number was 631 out of a total of nearly 21,000 effectives, and the number is tending to drop. The employment of a shifting and largely unskilled population presents a difficult problem, but the difficulties are intensified by the desire to prevent obvious competition with outside industry and the consequent restrictions placed on prison labour. Actually this competition must exist whether hidden or not.

An even more serious limitation on prison work arises at present from the shortage of staff. A full working day for the prisoners is only possible if the staff work on a 3-shift system, but with the present numbers this cannot be provided in all prisons. As a result, in the local P. the prisoners are working only 22 hours a week. In the open and training P., where a serious attempt at rehabilitation is being made, the Prison Com-

missioners realise that training in habits of good work is an essential element in such a process. Consequently, these special P. are given their full complement of staff so as to allow for a full working week of 40 hours. Virtually the whole of the shortage of staff is borne by the local P.

Though much prison work is without educative value, educational facilities of other kinds are increasing. Evening classes in most P. are now provided by the local authorities, instead of by voluntary workers, and prison libraries are linked to the bor. or co. libraries. Correspondence classes are also provided in some number. The provision of books and classes helps to prevent the mental stagnation that was an outstanding feature of prison life in the past. Though voluntary workers are no longer used for prison classes, they still function as prison visitors, providing a link with the outside world and an unofficial, human relationship. One modern development, still on a small scale, is the provision of psychiatric treatment. Wakefield has its own psychiatrist. Other long-term male prisoners can be sent to Wormwood Scrubs, where interesting developments in group psychiatry are taking place. Facilities for treating women prisoners exist at Holloway. Arrangements have been made to allow outside psychiatrists to attend short-term prisoners with the hope that treatment will be continued after discharge without a change of doctor.

Though psychiatric treatment is essential in some cases, it is admitted by the authorities themselves that prison does not provide a favourable background. A special institution for this purpose has been sanctioned and a site has been selected. As far as is known at present, the intention is to use this for neurotics and not for psychopathic offenders. For this latter group we still lack facilities, though Denmark and Sweden, the pioneers in this respect, have shown that more can be done for them than used to be thought possible.

Another important recent development is the introduction of social workers in prison to deal with the personal problems of the prisoners and to provide a link with the probation officers and social workers responsible for after-care. In the training P. the after-care organisations have for some years had full-time representatives to fill this role, though they have not hitherto always been trained social workers. In the P. where psychiatric treatment is given a psychiatric social worker is employed, and a social worker has been appointed at Brixton prison, the romand prison for men for the London area. In the local P. the scheme is still in embryo. The Departmental Committee on the Discharged Prisoners Aid Societies recommended that a full-time social worker appointed by the Societies should be available at every local prison. So far 3 only have been appointed as an experiment. In some of the continental

countries, notably France and Belgium, the social worker has become an integral part of the prison system, and at least 1 is employed in every prison.

Prison punishments are strictly controlled by statutory regulation, the power of the Governor being more limited than that of the visiting committee of justices. Punishments may take the form of loss of privileges, restricted diet, forfeiture of association, or cellular confinement. Associated with any punishment there is loss of remission. Unless forfeited by misbehaviour, prisoners receive remission of a third of their sentence. Visiting committees can order a prisoner to be flogged or birched for mutiny or violence to an officer. This is subject to confirmation by the Secretary of State (see FLOGGING).

In 1953 there were 45 men's P., with or without a wing for women, and 3 for women only. The average daily population was 19,200 men and about 900 women. Although these figures are somewhat less than those for 1952, the peak year, they are much above the pre-war figures, and overcrowding has become a serious problem. At the end of 1954 over 3200 men were sleeping 3 to a cell. The explanation is not primarily that more people are sent to prison but that the sentences are longer, owing partly to the increase in the number committed in respect of indictable offences compared with those committed for non-indictable offences (e.g. an increase in those committed for burglary and a decrease in those committed for drunkenness), partly to the longer sentences of corrective training and preventive detention that the Criminal Justice Act, 1948, allowed for habitual offenders (see CRIMINAL LAW). According to the Prison Commissioners' report for 1954, accommodation for preventive-detention prisoners has already been increased by using Nottingham prison, taking about 170 men, and an additional prison of about the same size will be needed every year for some time to come if the present level of committals continues. See *Annual Reports of the Prison Commission*; J. Watson, *Meet the Prisoner*, 1939; N. K. Teeters, *World Penal Systems*, 1944; M. Benney, *Gaol Delivery*, 1948; Sir L. Fox, *English Prison and Borstal Systems*, 1952; W. A. Elkin, *English Penal Systems*, 1957.

Prisrend, see PRIZREN.

Prístina, tn in Serbia, Yugoslavia, the cap. of the autonomous prov. of Kosovo-Metohija (q.v.). It is Oriental in appearance, with many old Turkish houses and mosques, but is being rapidly modernised. It has a large trade in agric. produce and wine. Pop. 24,200.

Prists, see SWORDFISH.

Pritchett, Victor Sawdon (1900-), novelist and critic, b. Ipswich. Educ. at Alceyn's School, he spent much of his early life on the Continent, and his work shows signs of Fr. and Sp. influence. His novels and collections of short stories include *Clare Drummer*, 1929, *Shirley Sans*, 1932, *Nothing Like Leather*, 1936, *Dead Man Leading*, 1937, *It May Never*

Happen, 1946, and *Mr Beluncle*, 1951; they are distinguished by realism and analytical quality. His critical works include *In My Good Books*, 1942, and *The Living Novel*, 1946.

Prittlewell, see SOUTHERN.

Privas, Fr. tn, cap. of the dept of Ardèche, on the Ouvèze. It has many old buildings. There is a printing industry, and the tn is known for its maroons glacés. Pop. 7400.

Private, see RANK.

Private Bills, see PARLIAMENTARY BILLS.

Private Company, see COMPANY.

Private International Law, see CONFLICT OF LAWS.

Private Presses. It is difficult to secure an agreed definition of a private press. A. W. Pollard offered one which may be acceptable: 'The productions of a private press should not be obtainable by chance and the owner must print for his own pleasure and not work for hire.' A more recent definition was given by John Mills in his 1956 St Bride's Lecture: 'One which functions free of any limitations of commercial exigencies, or, more simply, one which can print what it likes and how it likes.' Before the advent of printing there were a number of P. P. run either by royalty or by prelates; such estab. are called scriptoria. In more recent times Horace Walpole estab. the Strawberry Hill Press, at which, although he was no printer, a number of books and smaller pieces were produced by his craftsmen during the 40 years of its existence (1757-97). Another important pre-Morris press was that set up by Dr. C. H. O. Daniel (1836-1919) at Oxford. After starting with a toy press when he was 9 years old, Daniel began serious work in 1874. This press, it has been said, was 'the most truly private of all English P. P.' The outstanding figure in, and the father of, the modern private-press movement was William Morris (q.v.). Protesting against the untidy and slovenly appearance of books of his day, he set out to do better. He was not a printer, but his artistic temperament is shown in the books which were printed at his Kelmscott Press (1890-8), the greatest of which was a Chaucer, a copy on vellum being sold in Dec. 1956 for £2300. His teaching and example influenced others. C. H. St John Hornby ran the Ashendene Press (1894-1935), and T. J. Cobden-Sanderson the Doves Press (1900-17). In the background, interpreting the ideals and fostering the enthusiasms, was Sir Emery Walker (1851-1933), the adviser of Morris, type-designer for Hornby, and partner of Cobden-Sanderson. These 3 presses are the most notable. Others in the Brit. Is. who made a mark with their P. P. were: L. Pisarro, Eragry Press, London, 1894-1914; C. Ricketts, Vale Press, London, 1896-1903; C. R. Ashbee, Essex House Press, London, 1898-1919; the Misses G. E. and M. S. Davies, Gregynog Press, Newtown, Mont., Wales, 1923-40; and the Misses E. C. Yeats and E. Gleeson, the Dun Emer, later Cuala Press, Dublin, 1903 (latest book 1947).

Among the many other P. P. set up in Great Britain, the following may be mentioned: Beaumont Press, started by a London bookseller, Cyril Beaumont, in 1917; High House Press, run by J. E. Masters from 1924 until his death in 1943; Pear Tree Press, founded in 1899 by James Guthrie, who did some good work; St Dominic's Press, opened by H. D. C. Pepler in 1916 (he also worked for clients who appreciated the merits of hand printing); Lloyd Haberly in 1924 founded the Seven Acres Press, at which he printed, and bound in leather, books written and illustrated by himself; Guyon House Press, founded in 1938 by T. Besterman, its first book being an edition of *Magna Carta*; Fanfrollo Press, founded in 1922 in Sydney, Australia, by John Kirtley, who with Jack Lindsay brought it to London 4 years later; Latin Press, started in 1935 by Guido Morris, who produces the *Crescendo Poetry* series; and the Signet Press (one of the more recent P. P. in Great Britain), started in 1955 by Thomas Rea, his first book being extracts from the *Memoirs of Thomas Bewick*.

The oldest existing private press in the U.S.A. is that run by Mr and Mrs H. W. Trovillion at Havin, Illinois, which bears their name. It was founded in 1908. Other important Amer. P. P. include the Village Press, started in 1903 by F. W. Goudy (1865-1947) and his wife Bertha at Park Ridge, Illinois, and that of Dard Hunter at Chillicothe, Ohio. In sev. cases Hunter not only wrote the copy, made the paper, and designed, cast, and set the type, but also printed, bound, and pub. the books—probably the first books of modern times to be produced entirely by one man. There are upwards of 50 P. P. operating in the U.S.A.

On the Continent of Europe the private-press movement has its devotees, notably C. E. Poeschel and W. Tiemann, Janus Press, estab. 1907; F. W. Kleukens, Ernst-Ludwig Press, 1907; L. Wolde and W. Wiegand, Bremer Press, 1911; and E. W. Tieffenbach, Officina Serpentina, 1911—all in Germany. In Holland the Zilverdistel Press (renamed Kunera 1923), J. F. Royen, 1915, and the Heuvel Press, S. H. de Roos, 1928, should be mentioned.

Most of the P. P. had their own special type faces, and so jealous were the owners that when their presses closed at least 2 of them (Cobden-Sanderson and Ricketts) consigned the punches, matrices, and type to the care of the R. Thames. Of all P. P., probably the Doves Press achieved the highest point of typographical excellence for beauty, grace, and legibility. Its masterpiece was an ed. of the Bible in 5 vols., 1903-5.

In addition to the purely P. P., others with similar ideals have set up as ordinary business concerns. In many cases these presses come within part of our definitions in that the owners print what they like and how they like, but the policy includes offering their productions to the public. Yet it should be said that the work is

good; they are, in fact, P. P. flourishing in a commercial community. The most noteworthy of these quasi-P. P. are: Shakespeare Head Press, founded by A. H. Bullen in 1904, who produced the Stratford Town Shakespeare. In 1920 on the death of the founder the press was acquired by Blackwells of Oxford, and under the direction of Bernard Newdigate issued a Froissart and a Chaucer. Golden Cockerel Press, founded by H. M. Taylor in 1920, issued its first book a year later. Its private type face was designed by Eric Gill. Nonesuch Press was set up in 1923 by Sir Francis Meynell, Miss Vera Mendel, and David Garnett, its Bible in 5 vols. and eds. of Dante and Homer being among its outstanding achievements. Cresset Press, started in 1927, does not print the books it sponsors, the credit, especially for its Bunyan and Apocrypha, resting on its typographical work. Eric Gill operated a private press at his home at Pigotts, Bucks. In 1936, with his son-in-law, René G. Hague, he transformed the press into a limited company under the title Hague & Gill Ltd.

Because they are primarily instructional centres, this article has ignored the many technical colleges and secondary schools, the former having well-equipped printing departments and the latter doing their best, usually outside school hours, with more modest equipment.

Originally the P. P. used only hand presses (some do so to-day), and as a result their books were rather highly priced, but the machine is gradually being used in modern presses. A good deal of the care, taste, and inventiveness that used to be lavished on collectors' pieces is now going into everyday productions, though more often by the publisher's initiative than by the printer's. That the P. P. achieved their purpose in raising the standard of Brit. printing there can be no dispute. Morris found it careless and without imagination; to-day, if the well-planned and well-printed book (or leaflet) is accepted without comment, it is because a generation has grown up which expects little else. See W. Ransom, *Private Presses and their Books*, 1929; I. Haas, *Bibliography of Modern American Presses*, 1935, and *Bibliography of Material Relating to Private Presses*, 1937.

Privateers, armed vessels owned and officered by private individuals, but acting under a commission from the State, known as letters of marque, which allowed the owners to keep the prizes they captured, and granted them £5 for every man of the enemy killed or taken. By the Declaration of Paris in 1867, privateering was and remains abolished between the signatory nations when engaged in war with each other. See W. H. Johnson, *Wolves of the Channel*, 1931, which traces the hist. of Fr. privateering from the 17th cent. to the days of its extinction.

Privet, or *Ligustrum*, genus of evergreen shrubs. Common P., *L. vulgare*, is native; *L. ovalifolium* is the best hedge species, and *L. sinense*, most ornamental.

Privilege. This term in Eng. law has distinct meanings in different contexts. In legal proceedings certain documents and information are privileged from production in evidence at the trial. For instance, a party to an action cannot be compelled to produce documents containing advice from his legal or other professional advisers relating to the subject matter of the proceedings. The Crown, whether or not a party to proceedings, can claim Crown P. for the production of documentary or other evidence. If the appropriate Minister responsible for the Dept gives a certificate that the production of certain evidence would be against the public interest, the Court is obliged to exclude such evidence. In defamation, certain statements although defamatory are, if made on certain occasions, privileged and therefore not actionable. Certain classes of defamatory statements and documents even if untrue and malicious attach 'absolute privilege' and cannot give rise to damages. Examples are statements made in Parliament, papers pub. by the authority of either House, statements made in the ordinary course of judicial proceedings by judges, parties or their lawyers, communications between solicitors and clients and fair and accurate contemporaneous newspaper reports of judicial proceedings. Certain other defamatory statements are entitled to the defence of 'qualified privilege,' a defence which is not available if the defamer was actuated by malice. Examples of these are fair and accurate reports of local council meetings, the decisions of certain bodies such as the General Medical Council and communications between parties having a reciprocity of interest in them. See CONFIDENTIALITY; DEFAMATION; and PARLIAMENTARY PRIVILEGE.

Privileged Communications, see CONFIDENTIALITY; DEFAMATION.

Privy Council. Nearly all the branches of administration with which we are familiar—Parliament (q.v.), the Cabinet (q.v.), and the P. C. among them—had their beginnings in the *curia regis*, the court or council of the king of Norman times. On important occasions it met as the Great Council, the successor of the still earlier Saxon *witan*, but the main-spring that kept the business of the Gov. going was a smaller body within its framework which helped to make the laws, dispensed justice, and collected the revenue. The members of this were chosen by the king, and while its activities were much more limited after Parliament appeared and the Exchequer and Law Courts branched off into independence, it remained closely associated with the Sovereign, merging by almost imperceptible stages into what became known as the P. C., through which many of the royal functions continued to be exercised. After a time there was a further development. A few of the more influential counsellors, who formed an inner ring especially in the king's confidence, began to supersede the Council as a whole when

major questions had to be settled. Theirs was the decisive voice, and at the most the Council endorsed their conclusions. Before long, and as a result of this development, a new body destined to be of great constitutional importance was to emerge. This was the Cabinet. At first its position was rather indefinite, and like other innovations it was looked on with suspicion; but the early years of the 18th cent. saw it so well estab. that it was separated from the Council. By then an essential difference between the modern Cabinet and the P. C. had already appeared: the Cabinet was confined to members of the party predominant in Parliament and directed policy, while the Council, whose composition was not restricted in that way, was mainly occupied with the more formal duties that settled usage requires it to perform to this day. The P. C., therefore, can trace its lineage right back to the feudal world and is a continuation of the 'fertile parent stem' from which the complex executive machinery of to-day is derived. There is, indeed, still one momentous occasion on which the distant past and the present meet. At the beginning of a new reign, when the P. C., with the Lord Mayor and Aldermen of London and others, meet to acknowledge and proclaim a new sovereign, their action is a direct link with the gatherings of the *witan* at such a time many hundreds of years ago.

During its long existence the P. C. has varied greatly in size. There are now about 300 members—of whom some 40 come from the Dominions—and its ranks include representatives of very varied walks of life who have merited special recognition by the Sovereign. Membership, indeed, is a high distinction which is sparingly conferred, although for constitutional reasons those who hold certain important posts under the Crown—among whom are the members of the Cabinet—are admitted on appointment. New P. Councillors kiss the Sovereign's hand and take the Oath of Allegiance as well as the P. Councillor's Oath, which among other things binds them to keep secret 'all matters committed or revealed' to them, and still contains phrases that appeared in it in much the same form 500 years ago. When the Sovereign holds a Council, those whose presence is required receive a summons in the traditional form, which runs: 'Let the messenger acquaint the Lords and Others of Her Majesty's Most Honourable Privy Council that a Council is appointed to be held'—at such and such a place and time. Usually 4 P. Councillors are summoned, although the quorum is 3, but on special occasions the attendance is larger, as it was in 1947 when 12 Councillors heard the Royal Assent given to Princess Elizabeth's marriage. Nowadays the whole Council very seldom meets; in fact, it has not done so except at an Accession since 1839, when Queen Victoria's impending marriage was declared in Council. The place of meeting is generally Buckingham Palace, but Councils are held wherever

the Sovereign is in residence. Once or twice within fairly recent years they have been summoned to meet in private houses.

The P. C. has duties of its own, but its chief function is to act as the body 'by and with' whose advice certain things are done by the Sovereign. As constitutionally the Sovereign acts on the advice of Ministers, the decisions taken in Council necessarily reflect the views and policy of the Gov. It is for this reason that Privy Councillors who are members of the Opposition are unlikely to be summoned, unless the matters to be dealt with are exceptional and free from political controversy. Most of the business in Council is expressed in Proclamations or Orders in Council. Proclamations are usually reserved for the more important subjects, and after being approved in Council are signed by the Sovereign and pass under the Great Seal. Orders in Council, which bear the P. C. Seal, are authenticated by the signature of the Clerk of the Council. As a rule, Orders in Council are complete in themselves, but sometimes they set in motion a series of executive acts. That happens when a Royal Charter is granted. Then, the Order in Council approving the grant is the authority for a Secretary of State to submit for the Sign Manual a Warrant, which in turn gives directions for the Charter to be issued as Letters Patent under the Great Seal.

The proceedings in Council are not confined to the approval of documents. There may be an oral Declaration by the Sovereign, or Ministers may receive their Seals of Office. If a new Great Seal is brought into use, the Sovereign defaces or 'damasks' the old Seal with an oddly shaped little hammer; and once a year when the High Sheriffs of the Counties are appointed, the names of those chosen are pricked by the Sovereign with a bodkin as the long parchment Roll of Sheriffs is unwound.

The P. C. itself, as distinct from the Sovereign in Council, not only long since lost the wide powers it once owned, but also in more recent times and with the creation of new Departments has seen some of its remaining duties transferred elsewhere. Fifty years ago, what is now the Ministry of Education was still a Committee of Council, as the Board of Trade is to-day—in theory if not in practice—and it was not until just before 1914 that the Committee on Education in Scotland was abolished. A few years before that the Council ceased to administer the law of poisons, and other work it used to do is now undertaken by the Ministry of Agriculture, Fisheries and Food, and the Ministry of Health. But while this devolution was going on, Parliament occasionally reversed the process by giving the Council new functions. That happened, for instance, when the P. C. was put in charge of the Cinematograph Fund set up under the Sunday Entertainments Act in 1931, and when in the same year architects were added to those in the medical and other professions in whose affairs the Council has an interest.

To-day it has a very mixed collection of duties which may be of great antiquity or date only from yesterday.

The Lord President, who is one of the Great Officers of State, usually has heavy responsibilities in other directions as a member of the Gov. As President of the Council he has certain powers; but, generally speaking, things that have to be done by the P. C. are done to-day as they were in the past by Committees. Some of these are standing Committees—such as the Judicial Committee and the Committees which direct research in scientific, industrial, medical, and agric. matters. Other Committees are appointed to advise on questions referred to them by the Sovereign in Council: more often they are less formally constituted bodies which lapse when they have dealt with a particular item in the routine business arising from day to day. If the Committees have to report to the Sovereign in Council, their recommendations must be approved by Order in Council, but in less important matters the decisions may rest with the Committees themselves. They are then embodied in what are known as Orders of Council. The standing Committees—apart from the Judicial Committee and those connected with research—deal with questions affecting the Channel Islands, the Isle of Man and the Scottish Univs., and with certain recommendations for Honours. The short-lived Committees have many duties: among other things they consider petitions for the grant of Royal Charters or the creation of new boroughs; they have statutory obligations in relation to medical practitioners, veterinary surgeons, pharmacists, and architects, and their approval is usually required when new by-laws are made by chartered institutions. Almost in a new class by themselves, and set up soon after the beginning of a new reign, are 2 Committees of much historical interest, the Coronation Committee and the Court of Claims. The first, which prepares the detailed plans for the Coronation, now co-operates with a Coronation Commission, containing Dominion representatives and independent of the P. C. The Court of Claims, which dates back to the Accession of Richard II, has to decide who are entitled to perform traditional services during the ceremony.

One Committee that invariably sits is the Judicial Committee, the highest Court of Appeal in the Commonwealth. It was estab. in 1833, and scarcely ever adjudicates on appeals from the U.K., except in eccles. cases. The appeals that reach the Committee come from many parts of the Empire, their number sometimes making it necessary for the Committee to sit in 2 or even 3 Divisions. The membership is fairly large, but the tribunals are usually drawn from a panel consisting of the Lord Chancellor, the Lords of Appeal, and a number of distinguished judges who hold or formerly held office here or overseas. The Committee meets in Downing Street, and the

hearings, which are occupied mainly by arguments on difficult points of law, may raise extremely important issues. See *Parliamentary Affairs*, Vol. II, No. 1, *The Privy Council To-day*, by the Rt. Hon. Herbert Morrison, M.P.

Privy Seal, see SEAL.

Privy Signet, see SIGNET.

Prize Court. P. C.s are estab. in belligerent civilised states to investigate cases of maritime capture and to condemn property as lawful prize or award restitution and compensation. According to Eng. Admiralty law 'prize' extends to all property captured *jure belli* on the sea or in foreign ports or harbours; or captured on land by naval forces acting alone or jointly with land forces; money received by way of ransom; and property captured in the rivers, ports, or harbours of the captor's country. P. C.s adjudicate on property belonging both to enemy belligerents and to neutrals and are open to all persons regardless of nationality. They are national tribunals, though they administer rules which may be based on international law. They in fact do administer international law (Prize Court in the *Zamora*, 1916), though the Ger. P. C.s always insisted that they apply municipal law (see also the *Panagiotis*, 1943, for a statement on this point). The law administered by the Amer. P. C.s, as in the case of the Brit. P. C.s, is international law (*Paquete Habana*, 1900). P. C.s are not bound by an Order in Council which is contrary to international law.

At the second peace conference at The Hague, 1907, and the London conference, 1908, an attempt was made to establish an international court of appeal to which neutrals, and in certain cases belligerents, might have recourse when dissatisfied with the decisions of the P. C.s of the captor, but though this was agreed upon in the Declaration of London (q.v.), no such court was set up. P. C.s may not be set up by a belligerent in neutral ter., though they may sit in the ter. of an ally. Neutral courts may exercise prize jurisdiction where the prize was taken in violation of the national ter., and where the prize was captured and abandoned and is the subject of a salvage claim by the neutral power. The decision of the P. C.s is final, though the territorial state is internationally responsible; hence a neutral state may claim satisfaction if aggrieved by the decision.

When a belligerent captures a commissioned vessel belonging to the enemy gov., she becomes on capture his own property, and he is entitled to deal with her as he pleases. All persons found on board become prisoners of war, and all goods become the property of the captor. In the case of an enemy merchant ship there is neither unanimous opinion nor uniform practice as to the relation of seizure to ownership. In practice, systematic destruction of enemy prizes has been the exception, and the general rule is that all prizes are brought in for adjudication, unless there are practical difficulties in

the way of such a course. During the First World War the Fr. P. C. adopted the rule that the destruction of an enemy merchantman is legally justifiable, when the circumstances of the case imperatively demand it (the *Mahrousech*, 1915). The same principle was held to be applicable to absolute contraband (q.v.) cargoes. On principle, there can be little doubt that, if the right to capture private property is conceded at all, the destruction of enemy prizes is justifiable in circumstances of *force majeure*; the chief safeguard against it lies in the fact that it is contrary to the interest of the captor to destroy what is certain to become his own property, if such destruction can be avoided. The obligations of belligerents with regard to enemy merchantmen apply much more emphatically to the case of neutral merchantmen, so that the precedents cited for the former may be invoked *a fortiori* for the latter. Under the customary law it has long been an established rule that captured neutral vessels must be taken in for adjudication, and if this be found impossible they must be released, even if there be a doubt whether they are neutral or enemy. The plea of military necessity will not avail; and the captor may not arrogate to himself the functions of a judicial tribunal. It is only a valid adjudication of a P. C. that transfers the ownership to the captor: till then he may not deal with the prize as he deems fit. So long as neutral vessels do not violate their neutrality they must be left alone, subject to visit and search in case of suspicion. It has, however, been recognised, even in Brit. courts, that there may be exceptional cases in which destruction may be justified, though not without paying full compensation to the owner. But the question whether the destruction of neutral ships is justified in cases of absolute military necessity and other exceptional circumstances has been much disputed. The unratified Declaration of London (1909) provided that they must be 'taken into such port as is proper for the determination there of all questions concerning the validity of the prize'; but Articles 50-1 provide that they may be destroyed if the safety of the captor is involved or there is exceptional military necessity; and further that all persons on board must be placed in safety and the ship's papers must be taken on board the warship. During both world wars, however, Germany sank many neutral vessels without providing for the safety of those on board. By the treaty of Washington, 1922, it was declared that a merchantman must be ordered to submit to visit and search before it can be seized and must not be attacked unless it refuses to submit to visit and search or to proceed as directed after seizure; that a merchantman must not be destroyed unless the crew and passengers have been first placed in safety; and that belligerent submarines are not under any circumstances exempt from the universal rules above stated.

See C. J. Colombos, *Law of Prize*, 2nd

ed. 1941; A. P. Higgins and C. J. Colombos, *International Law of the Sea*, 1943; L. Oppenheim, *International Law*, vol. II: *Disputes, War and Neutrality*, 6th ed. by H. Lauterpacht, 1944; S. Jackson, *Manual of International Law*, 2nd ed. 1947; also E. S. Roscoe, *Reports of Prize Cases, 1745-1859*, 2 vols. 1905.

Prize-fight, boxing contest fought with bare fists, for a money prize. It is illegal in Britain and the U.S.A., gloves always being worn in contests. P.s were popular in England, 1750-1850.

Prize Money originated in remote hist. to encourage adventurous spirits to take to the sea. In 1243 Henry III created the first privateersmen, who were allowed to indulge in what were virtually piratical activities at sea so long as they gave half the spoils—or prize—to His Majesty. Thus for many centuries prize was the only thing to recommend a life at sea, and there were many opportunities, especially in the Elizabethan era, for fabulous captures. In fact, privateering was not abolished until the Declaration of Paris in 1856. In the Commonwealth Act of 1649 the half share previously claimed by the king went to the treasurer of the Admiralty for charitable purposes, but it was not until the reign of William and Mary that pillage was abolished, and an Act passed under which everything in a captured ship had to be condemned as prize and then distributed among the captors. In the reign of Queen Anne (1702-14) the prize fund was vested in the Crown, and a substantial portion of it in the shape of a grant then made to the captors, for whom an exact ratio of shares was laid down.

During the period of the Georges large fortunes were again made out of P. M. Adm. Lord Anson, for instance, in a voyage round the world, took over £1m. in P. M., of which his share came to £125,000. Later, after the battle of Cape Finsterre, the resultant rounding up of a Fr. convoy brought him another £62,991. Adm. Sir Charles Saunders, when commander-in-chief Mediterranean, captured the Sp. treasure ship, *Hermione*, on 21 May 1762, as a result of which his share was £64,963, while every lieutenant concerned received £13,000 and each seaman and marine £485. In addition to P. M. derived from the value of a ship and its cargo, a system of bounty had been introduced by which those officers and men of a ship of war actually present at the capture or destruction of an enemy ship were entitled to have distributed among them a sum calculated at the rate of £5 for each person on board the enemy's ship at the beginning of the engagement.

At the beginning of the First World War it was recognised that modern conditions made it unfair to adhere to the old rule of distributing P. M. only to the actual captors, and it was decided that all those serving in the R.N. at sea should be eligible. At the end of that war P. M. amounted to some £14m. out of which admirals received approximately £3000,

captains £800, and able seamen £25. During the Second World War, however, the enemy did not allow so many of his ships to be captured, and scuttled them instead. As a result, the total P. M. amounted only to £7,250,000, of which £2m. was allocated to the Commonwealth countries and £1,250,000 to the R.A.F., without whose co-operation many captures would not have been made. The £4m. left to the R.N. was then distributed in more equitable ratios among those who had spent 180 days at sea during the war. This embraced some 57,000 officers and 598,000 men. So an admiral of the fleet received only £40, a captain £16, a lieutenant £13, a petty officer £6, and a seaman £4. Meanwhile the Air Council had decided that as they could draw no distinction between individuals of different commands—which meant that the individual share would be very small—they would apply the entire amount to R.A.F. benevolent and welfare funds.

It had, however, previously been announced on 19 Dec. 1945 that P. M. was now going to be paid for the last time, as under modern conditions it raised so many anomalies and inconsistencies. In future, should hostilities again break out, it will be assimilated into the normal grant of gratuities.

Prizren (Prisrend; Rom. Teranda), tn in Serbia, Yugoslavia, in the autonomous prov. of Kosovo-Metohija (q.v.). In the Middle Ages it was for a time the cap. of the King of Serbia. It is a picturesque Oriental tn, and has a 14th-cent. church, an ant. fortress, and many other old buildings. There are textile and glass industries, and the tn is known for its silver filigree and embroideries. Pop. 23,300.

Prizzi, tn in Sicily (q.v.), 28 m. SSE. of Palermo (q.v.). Pop. 10,000.

Proa (Malay *prahu*), narrow canoe, 30 ft long by 3 ft wide, used by natives of the Ladrone Is. The stem and stern are similar, the boat sailing either way. The lee side is flat, so that the canoe resembles half a vessel, divided vertically in the line of the keel, and a weighted framework is swung out to leeward to adjust the balance.

Probabalism and **Probabiliorism**, see MORAL THEOLOGY.

Probability (in logic), the presumption that some statement is likely to be true or that some event is likely to happen, when sufficient evidence to constitute absolute proof cannot be secured. The term is also applied in logic and mathematics to the amount of antecedent likelihood which exists for the occurrence of a certain event, as calculated from the relative frequency of the occurrence of similar events in the whole range of past experience. In this connection the investigation of P. has been performed chiefly in connection with games of chance. The first work to treat of this was Demolivre's (q.v.) *Doctrine of Chances*, and the subject is worked out with especial fullness in such works as J. Venn's *Logic of Chance* (ed. 1888). The same

question of P. is the basis of the work of all insurance societies, and their success depends almost entirely upon the accuracy of the formulae and results obtained by their actuaries. The whole subject forms an important branch of mathematics. P. is also one of the 'notes' of theological propositions, which are probable, more probable, and most probable according to the weight of opinion behind them.

Probability (in mathematics) is that part of algebra which deals with the P. or chance of the happening of an event or any one of a number of events one of which must occur. The general definition of P. is stated thus: If an event can happen in a ways and fail to happen in b ways, and, except for the numerical difference between a and b , is as likely to happen as to fail, then the P. of its happening is

$$\frac{a}{a+b} \text{ and that of its failing } \frac{b}{a+b}.$$

For example, consider a bag containing 6 white balls and 7 black balls, and apart from the difference in the numbers we are as likely to draw white as black, then the P. of drawing white is $\frac{6}{13}$, and of drawing black $\frac{7}{13}$. This P. does not state which will actually happen, but that if an infinite number of trials be made, the number of times a white or black ball is drawn will not deviate very far from this ratio. This method is used in the data of assurance companies in estimating the P. of the occurrence of events. *Certainty*, i.e. that the event will occur without fail, is expressed mathematically as unity, as may be deduced from the definition. Hence, if a be the P. of the occurrence of an event, $1-a$ is the P. of its non-occurrence. A few simple laws of P. may be stated: (1) If different events are mutually exclusive, i.e. the occurrence of one event prevents the occurrence of another, the P. of either event occurring is the sum of the P.s of the separate events. (2) If a and b are the P.s of 2 independent events, the P. that both should happen is ab ; e.g. find the P. of throwing heads twice in 2 tosses of a coin. For 1 throw the P. of throwing heads is $\frac{1}{2}$, hence for 2 it is $\frac{1}{2} \times \frac{1}{2} = \frac{1}{4}$. (3) If the P. of the happening of an event in 1 trial be p , the P. of its happening r times in n trials is the $(r+1)$ th term in $(p+q)^n$, where q is the P. of its not happening in 1 trial, i.e. $q=1-p$.

Expanding this by the binomial theorem,

$$(p+q)^n = p^n + np^{n-1}q + \frac{n(n-1)}{2!}p^{n-2}q^2 + \frac{n(n-1)}{r!}p^{n-r}q^r + q^n. \text{ The } (r+1)\text{th term} = \frac{n(n-1) \dots (n-r+1)}{r!}p^{n-r}q^r.$$

Two or three examples may be taken to illustrate the type of problem solved by P.: (1) Three cards are drawn from a pack at random; find the P. that they will consist of a knave, a queen, and a king. The knave, queen, and king can each

be drawn in 4 ways; any 3 cards can be drawn in $\frac{52 \cdot 51 \cdot 50}{2 \cdot 3}$ ways; \therefore required

$\frac{4}{\frac{52 \cdot 51 \cdot 50}{2 \cdot 3}} = \frac{16}{5525}$ (2) In a game A's skill is to B's as 3 to 2; find the chance of A winning 3 games at least out of 5. As in law (3) A's chance of winning is $\frac{3}{5}$ and of losing $\frac{2}{5}$. Therefore required chance is the first 3 terms of $(\frac{3}{5} + \frac{2}{5})^5$, which reduces to $\frac{2133}{3125}$.

Probate. P. of a will is a document issued by the Probate Court (q.v.) which certifies the validity of the will and the executor's title to administer the testator's estate. Executors require P. in order to sell the testator's land or investments or to transfer them to beneficiaries. As a testator may appoint any number of executors, P. may be granted to all of them; but a grant of P. to one executor only enables all to act upon it, with the result that in most cases it is unnecessary for the others to prove. A will may be proved either in *common* or *solemn* form. A will is said to be proved in common form when P. is granted in the absence of the parties interested under the will, but on proof of its identity and genuineness; in solemn form, when a final decree is pronounced by the court. In the latter case the executor must cite the various parties entitled to the property, whether under the will or on intestacy, and satisfy them before the court that the will was duly executed and that the testator was in full possession of his faculties when he made the will. The cited parties have full liberty to dispute the will. P. in common form is revocable; but P. in solemn form is irrevocable as against all the persons cited unless a subsequent will be found. See EXECUTOR; REGISTRAR, Probate; WILLS.

Probate, Divorce, and Admiralty Division. The P. D. A. D. of the high court, which was constituted by the Judicature Act, 1873, has 7 judges, of whom the chief is called the president. Its jurisdiction in probate, matrimonial, and admiralty matters was, prior to 1873, shared by sev. courts. At Somerset House 5 registrars deal with divorce and probate matters; certain prov. tns have dist. probate registrars, who issue grants of probate and letters of administration (q.v.). The interlocutory and administrative work in admiralty is dealt with by a registrar and an assistant registrar at the Law Courts, Strand. See also PROBATE; DIVORCE.

Probation. The development of P. is perhaps the most characteristic feature of the Brit. and Amer. penal systems. On the Continent it has not played the same role, owing primarily to the existence of the fixed sentence for a given offence. When used it generally takes the form of a suspended sentence, which is unknown under Eng. law, and there is nothing comparable to our highly trained P.

service. P. grew out of binding over to be of good behaviour, and it was a logical step to give assistance towards the achievement of such behaviour by some form of supervision. In the early stages supervision was a voluntary activity carried on by the Police Court Missionaries, who had first been appointed by the Church of England Temperance Society in 1876 to try to reclaim drunkards appearing before the courts. P. became legally recognised under the Probation of Offenders Act, 1907, and after 1925 every court had to have the services of a P. officer at its disposal. P., like binding over, did not in the first instance count as a conviction. A P. order could be for any time up to 3 years, but there was no lower limit. Under the Criminal Justice Act, 1948, a lower limit of 1 year was fixed. The Act also altered the status of the P. order, which now counts as a conviction, though it cannot be taken into account for the purpose of any enactment which imposes any disability or disqualifications upon convicted persons, e.g. loss of pension, such as may follow other forms of conviction and punishment.

The duty of the P. officer is to 'advise, assist, and befriend' those placed under his care. P. is essentially a non-institutional form of training adapted to the needs of the individual. It has followed the general line of development of all skilled social work, that is to say, it aims at strengthening the independence of the individual and his capacity to grapple with his own difficulties. It does not encourage him to accept philanthropic help and advice and remain passive, but rather makes heavy demands upon the probationer. At the same time it recognises that in addition to altering the offender's attitude to his environment it also may sometimes be necessary to alter the circumstances of that environment.

With juveniles the P. officer has to work as much with the family as with the offender, and this is also often true of the adults. The P. officer has in fact to find out what lies behind the offence—whether it is a matter of family difficulties, unsuitable work, physical or psychological needs, etc.—and deal with the case accordingly.

The courts can strengthen the P. order by adding any requirement they consider advisable. The most common are a requirement of residence, perhaps in a P. hostel, when it is desirable the offender should temporarily leave home, and a requirement of mental treatment, either as an in- or out-patient, on the advice of a qualified medical practitioner experienced in the diagnosis of mental disorders.

An important part of the work of the P. officer is the provision of social reports giving a picture of the character and background of the offender, without which it is impossible for a court to come to any reasonable decision as to whether P. is likely to be successful or not. These presentence inquiries have become almost a matter of routine in the juvenile courts,

though they are less frequently used in the adult courts, especially the higher courts.

P. is used with considerably greater frequency for the younger age groups. In 1954 41 per cent of males under 14 found guilty of indictable offences were put on P., 42 per cent of those between 14 and 17, 26 per cent of those between 17 and 21, and 10 per cent of those over 21. With women and girls the percentages are higher throughout, but follow the same pattern. This situation is probably due to the general belief that P. is likely to be most successful with the younger age group, but statistical investigation does not bear out this theory.

Since the Second World War there has been a marked shift from P. to fines. Taking as an example males aged 17-21: in 1938 15 per cent of those found guilty of indictable offences were fined and 42 per cent put on P. In 1954 36 per cent were fined and 26 per cent put on P. The change is largely due to the shortage of P. officers. Their work has increased owing to the increase in the total number of offences, the increase in the number of cases coming to the matrimonial courts, and the greater responsibility placed on the P. officers in connection with the after-care of ex-prisoners, Borstal and approved school cases. The numbers have not kept pace with these increasing demands, though the position has improved.

Under the Criminal Justice Act, 1948, prisoners released on licence, i.e. certain prisoners under 21 years of age and persons sentenced to corrective training or preventive detention (see CRIMINAL LAW) and persons released on licence from Borstal (q.v.), must be placed under the supervision of a named society or individual. In practice, this means that most of the after-care work for these classes is done by the P. officers, who also do much of the approved school (q.v.) after-care. All such work is now recognised as part of their official duty.

The P. officers are appointed locally, but the training is organised and the candidates for training selected by the P. Advisory and Training Board, a body of independent experts appointed by the Home Office. The training involves a 3-year degree course or a 2-year university social-science course, followed in either case by a 9-month course in the theory and practice of P. Salaries are now slightly above the Burnham scale for teachers. See Elizabeth Glover, *Probation and Re-education*, 1949; United Nations, *Probation and Related Measures*, 1951, *Proceedings of the European Seminar on Probation*, London, 1952, *Practical Results and Financial Aspects of Adult Probation in Selected Countries*, 1954.

Proboscidea, see ELEPHANT.

Proboscis Monkey, large Bornean species of leaf-eating monkey (*Nasalis larvatus*) in the male of which the nose is prolonged to hang below the upper lip. It is red in colour.

Probus, Marcus Aurelius (AD 235-82), Rom. emperor (276-82). He served with distinction under Valerian and later emperors in Africa, Asia, and Germany. Tacitus (275-6) made him governor of Rome's eastern possessions, and on his death the Army chose P. as emperor. He fought successfully against the Germans, driving them out of Gaul, but was murdered by mutinous soldiers. See Aurelius Victor, *De Caesaribus*, and *Epitome*.

Procaine, synthetic alkaloid which in the form of its hydrochloride $C_{10}H_{12}O_4N_2 \cdot HCl$, is widely used as a local anaesthetic in dentistry, etc. It is much less toxic than cocaine, which it has largely displaced.

Process, in law, the whole course of proceedings in a civil or criminal cause. In a more limited sense P. denotes either (a) the writ of summons, warrant, or other instrument by which the defendant is compelled to appear in court, or (b) the writs which issue at the instance of a party to a suit to compel the other party or some third person or persons to do some act connected with the proper trial of the action, e.g. a writ of *subpoena duces tecum*, to compel the production of documentary evidence (see also MESSE, *Messe Process*, and INTERLOCUTORY PROCEEDINGS). In Scots law P. means the proceedings in a cause and the documents relating to it.

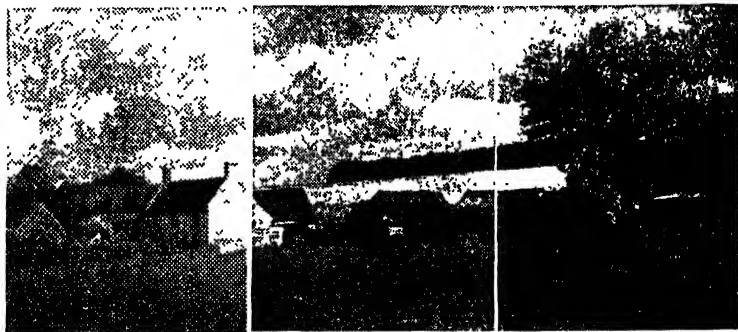
Process Work, or more correctly Process Engraving, term generally understood to denote the photo-mechanical method of reproducing drawings or objects on a relief printing plate, or block. The definition thus excludes intaglio and planographic methods such as photogravure (q.v.) and photolithography (see under LITHOGRAPHY). There are obvious practical advantages in having illustrations in the form of relief blocks, rather than drawn on a lithographic stone or engraved in a copper plate. The printing image on a relief block is raised above the surrounding areas, and this same principle operates when printing from type. The printer can therefore look up type and illustration blocks in the same forme and print them both in the one impression. Books have been illustrated in this fashion since the earliest days of printing, and the kind of block largely used over the course of 4 centuries, prior to the advent of photography, was the hand-engraved wood block. In the 19th cent. the rapid expansion of commercial printing in the realm of periodical and magazine work, as well as books, saw the growth of professional engraving. The engraver was not necessarily a creative artist himself, but simply trans. other artists' work into a form acceptable to the printer, often with an amazing virtuosity. With the existence of such a demand for the engraver's work, now quite divorced from the artist, the time was ripe for a mechanical method of block-making that would eliminate the laborious hand work involved.

The early part of the 19th cent., which saw the beginnings of so many of the mechanical methods in use in the pro-

duction of printed work, and the materials on which the printer relies, saw the first gropings in the attempt to use the action of light in order to obtain an exact reproduction of a design or image independently of the uncertainties of hand work. The earliest attempts in this direction were made by Joseph Niepce, of Chalon-sur-Saône, who, in 1813, took up the study of lithography but, having some difficulty in supplying himself with the proper stones, started a series of experiments with tin plates coated with resins known to be sensitive to light, especially bitumen, which also possesses the property of becoming insoluble if sufficiently exposed to sunlight. He applied to his tin plates a solution of bitumen dissolved in oil of lavender.

slow and costly printing method of the copper-plate press and, by a reversal of the process of etching the black lines *into* the plate, produce a relief printing surface which could be easily and rapidly used by a letterpress printer.

Process engraving to-day can be divided into 2 separate categories, line engraving and half-tone engraving. Line engraving is the method used to reproduce drawings on which the artist has worked in sharp black-and-white definition with no intermediate tone values, e.g. pen or scraper-board drawings (though mechanical stippling can be added to suggest middle tones). The process can be extended to reproduce drawings in more than 1 colour, provided the colours are solid and flat, and not of varying tonal strength. Half-



Odhams Photo-Engravers

Photograph by Harold Burdett

HALF-TONE SCREENS

The three sections of this picture show the effect of a screen in a half-tone block. On the left is a screen used largely by newspapers (65); those in the middle (85) and on the right (100) are used in journals and bookwork.

When dry, he placed the plates under copies of engravings and exposed them to sunlight, afterwards developing the resulting image with a mixture of oil of lavender and petroleum. This solvent also washed away those portions of the varnish which had been protected from the action of light by the details of the engraved print, leaving the bare metal; the plate was then etched with acids and an intaglio produced, from which prints could be taken with the aid of a copper-plate press. Incidentally his experiments in this direction, with copper plates surfaced with silver, in conjunction with his partner Daguerre, led to the perfecting by the latter in 1839 of the first successful method of producing the photographic image (daguerreotype), thus in effect laying the foundation of all the modern process work as we know it. Niepce was the first to engrave on metal by mechanical and chemical action, and print copies from the plate. It will readily be seen that from this successful result it was comparatively easy to get away from the

tone engraving is used to reproduce original subjects consisting not only of contrasting black and white but also of intermediate tones of varying depth, e.g. photographs, wash drawings, and pencil sketches. In the field of colour it is capable of reproducing artists' fully coloured paintings, photographic colour-transparencies, and still-life subjects photographed direct. It will be understood from the principle of letterpress printing (*see* PRINTING) that a relief half-tone plate is only capable of printing an even film of ink on the paper. The appearance of intermediate tone values is therefore illusory and is created by a regular series of dots of varying sizes, larger in dark areas of the image and becoming smaller, with therefore more white space between them, in the lighter areas. The comparison may be made here between this process and photogravure. The latter also prints a dot formation, but as it is an intaglio process the ink is held in recessed cavities etched to varying depths below the surface of the plate. When

printed the dots are therefore all the same size, but tonal variation is achieved by the amount of ink transferred to the paper, more in the darker tones and less in the lighter. This, combined with a slight tendency for photogravure to spread on the paper, gives a greater effect of continuous tone and a generally softer result than relief half-tone printing. The latter better reproduces sharp clear tonal contrasts. The following, briefly explained, are the details of line and half-tone process engraving.

Line Engraving. A photographic negative on a glass plate is first made of the original drawing, an optical prism being placed at the camera aperture. The prism has the effect of reversing the negative image, so that at the final stage of the process it appears the right way round. A metal plate, usually zinc, is then coated with a light-sensitive solution of albumen and ammonium bichromate and the negative is then printed down on it. The light passing through the clear areas of the negative (the black parts of the original drawing) hardens the coating of the plate on which it falls and renders it insoluble in water. The surface of the plate is next rolled up with ink and washed in water, which dissolves the unaffected parts of the coating, leaving only the original image. The image is then further treated with a powder of bitumen or resin to make it acid-resistant, and the whole plate immersed in a bath of nitric acid. The acid attacks the unprotected parts of the plate, and after a series of controlled etches the surface is eaten away and the image is left in relief. The plate is then cleaned up, finished off, mounted on wood to type-height, and is ready for printing. The method of making line blocks in colour varies according to the nature of the drawing supplied, and a process engraver generally prefers a series of working drawings made in black of each colour to be printed. If, however, a fully coloured original is supplied it may be necessary to make a tracing or 'key' of the outlines of all the colours. The key is then printed down on to as many separate plates as there are colours to be reproduced. Guided by the key, the etcher paints an acid-resist over ('stopping out') the portions of each plate which it is required to print in the various colours, and the plates are then etched in the usual manner.

Half-tone Engraving. As noted above, this process is used for reproducing continuous-tone originals, and relies on the use of a half-tone screen. This is a glass plate with a series of black lines ruled on it at right angles to each other. When placed in front of the negative in the camera the light passing through the interstices of the screen is broken up and falls on the negative as a series of dots, larger in the high lights and smaller in the shadows. The original continuous-tone image is thus registered on the negative as a regular series of solid dots of varying sizes. Thenceforward the process is similar in principle to line engraving.

Half-tone etching is a more highly skilled operation than line etching, as the etcher has by his own craft to make good certain deficiencies inherent in camera reproduction, replacing tones that have been lost in the process. The tendency is for light and dark tones to even out, giving an overall flatness and lack of contrast. The plate is given a series of etches, a portion of the image being stopped out before each etch, commencing with the darkest tones and working to the lightest. The effect of this is to etch the shadows least and the high lights most, and by skilful work the tones of the original can be restored and even enhanced. The rulings on half-tone screens vary from 45 to 225 lines to the inch, the choice of screen ruling being governed by the quality of paper on which the finished block is to be printed: 65 screen is the finest suitable for newsprint or similar low-grade paper, 150 screen is the average for good-quality catalogue or bookwork on coated art paper; finer screens are used almost exclusively for reproducing scientific or similar illustrations containing fine detail. Half-tone plates are usually made of copper, which is more malleable than zinc and less brittle after subjection to the heat that has to be applied at certain stages of the process.

Colour half-tone is founded upon the principle that all colour values can be broken down into the 3 primary sensations. From the coloured original a series of 3 half-tone negatives is made, the light being allowed to pass first through a glass filter, of a different colour for each negative. The 3 filters are violet, green, and orange (though usually referred to as blue, green, and red) and allow respectively the yellow, red, and blue components of the colours of the original to be recorded in their correct proportions on the 3 negatives. Half-tone plates are then made from the negatives and printed in yellow, magenta-red, and blue in exact register to re-create the colours of the original. Yellow, being the most opaque ink, is usually printed first, and as it is also usually of the greatest colour-density of the 3 it provides a base on which the red and blue will print with more brilliance. For subjects that have heavy depths of tone it is usual to print a fourth plate in black, and this has also the effect of sharpening the final result and enriching the black tones. Here again much hand work is required to make good the inherent photographic deficiencies. A skilled colour-etcher must learn to recognise, for example, the size of screen dot that is required on any plate so that when combined with the others it will reproduce the correct colour value. Screens as coarse as 80 can be used for printing colour work on a non-coated paper, but for good-quality work on art paper 133 and sometimes 150 screen are used. The process is capable of reproducing a wide range of subjects from works of art in oils to commercial studio drawings for magazine illustration and colour-transparencies such as Kodachromes and Ektachromes.

See W. J. Smith, K. L. Turner, and C. D. Hallam, *Photo-engraving in Relief*, 1951, and H. Curwen, *Processes of Graphic Reproduction in Printing*, 1947. See also ELECTRONIC ENGRAVING.

Procida, is. of Italy, at the NW. end of the Bay of Naples (q.v.), 2 m. from the mainland. It is of volcanic origin. Vines and fruit are grown, and at the tip of P. (pop. 9300) on the NE. coast there are fisheries.

Proclamation, constitutional mode of declaring the queen's will (as to which see CROWN), or the will of the chief executive of a nation. For the most part P.s can be binding on the subject only in so far as they are grounded on the law of the land. They are principally used for solemn declarations of war, peace, or state of emergency, and on ceremonial occasions such as the accession of the monarch. All Brit. P.s are made by the queen in council and must pass under the Great Seal (q.v.).

Proconsul. Under the early Rom. republic a P. was a consul whose year of office was prolonged in order to allow him to complete a victorious campaign. Later the term was applied to one who, having served his term as consul, received the government of a province.

Procrustes (Greek for the Stretcher), a robber in Attica, also called Damastes or Polypemon. He fastened his captives to a bed, and adjusted them to its length by racking or amputation. He was killed by Theseus.

Proctor, Adelaide Ann (1825-1864), poetess, b. London, daughter of Bryan Waller P. She contributed verses to *The Book of Beauty* in 1843, and subsequently to *Household Words* and the *Cornhill Magazine*. In 1858 she collected her poems and pub. them under the title of *Legends and Lyrics*. Some of her verses have charm and individuality. See E. S. Robertson, *English Poetesses*, 1883.

Proctor, Bryan Waller (1787-1874), poet, b. Leeds. Educ. at Harrow, he practised successfully as a solicitor in London. He contributed to the *Literary Gazette* from 1815, and made the acquaintance of Lamb (whose biography he wrote in 1864) and Leigh Hunt, whose influence is perceptible in his writings, and also knew Robert Browning and Swinburne. Under the pseudonym of 'Barry Cornwall,' an imperfect anagram of his Christian names, he produced at Covent Garden a tragedy *Mirandola*, which ran 16 nights (Jan. 1821), and pub. sev. vols. of verse, including *English Songs*, and other *Smaller Poems*, 1832. It is by his songs that he is remembered. An *Autobiographical Fragment*, ed. C. Patmore, was pub. in 1877. See life by R. W. Armour, 1935.

Proctor, anglicised form of the Lat. *procurator*, an agent or manager. Technically the word means: (a) univ. officials selected from the masters of arts to enforce the univ. statutes and generally to maintain discipline and good order, and (b) representatives of cathedral or other

collegiate churches and of the ordinary diocesan clergy in convocation. It was formerly also used to denote practitioners in the eccles. and admiralty courts, but this use of the word is obsolete since Parliament enabled solicitors to perform all the legal duties of a P.

Procurator in a general sense signifies a manager or agent, but has come to denote exclusively solicitors or 'law agents' in Glasgow and other Scottish dists., who practise in the inferior courts, and are members of the Incorporated Society of P.s. The Law Agents Act, 1873, placed P.s in all respects on the same footing as other law agents.

Procurator-fiscal, in Scotland, the local officer appointed formerly by the sheriff with the sanction of the home secretary, but now by the lord advocate, whose official duties may be regarded as comprising at once those of the public prosecutor, coroner, and former grand jury of England. The P. of a co. or dist. of a co. is, in fact, the proper person to take the initiative in cases of sudden, suspicious, or accidental death. In such cases he makes inquiry and reports to the Crown Agent, who decides further procedure.

Procyon (α Canis Minoris) is the lesser dog-star, magnitude 0.48; its spectrum is intermediate between those of the sun and Sirius. Bessel determined its proper motion and announced its binary nature in 1896. Schaeberle detected the companion, magnitude 13, emitting about

$\frac{1}{200000}$ the solar light, and of over one-half the solar mass. Auwers found (1862) a period of 40 years. Parallax 0.30" gives a distance of 11 light years; speed at right angles to line of sight, 12 m. per sec.; approaching the sun at 3 m. per sec.

Prodigious (c. 480-400 BC), (Gk sophist of the time of Socrates, b. at Iulius in Ceos. He lectured at Athens and elsewhere, among his pupils being Isocrates and Euripides. His *Choice of Heracles* is preserved in Xenophon's *Memorabilia*.

Producer Gas, see GAS MANUFACTURE.

Production, Census of. The Board of Trade and the N. Ireland Ministry of Commerce take C.s of P. at intervals to ascertain the total amount of industrial production (gross output) in the U. K.; the cost of materials and fuel used in production and payments for transport and work given out; the difference between these amounts, which is the value added in production to materials, etc. (net output); the number of persons employed in production; and other cognate information. These aggregates are analysed to show the results for individual industries or groups of industries, geographical areas, etc. As finished products of one firm frequently form the materials of another, there is some duplication in the total gross output of all firms, but relatively much less within a single industry. This duplication is automatically eliminated from net output, and the duplication in gross output has been estimated for most of the censuses.

The first C. of P. was taken in the U.K. for

1907 under powers given by the Census of Production Act, 1906, which strictly defined the questions which might be asked. The second census, for 1912, was interrupted by war and never completed. Later censuses under the 1906 Act were taken in 1924, 1930, and 1935. The Import Duties Act, 1932, and Finance Act, 1933, authorised more detailed inquiries into the production of certain classes of goods. Five such inquiries were held between 1933 and 1939, that for 1935 supplementing the C. of P. for that year. In 1946 a partial census was taken under Defence Regulations. The Statistics of Trade Act, 1947, provided for a C. of P. every year, and gave powers enabling full inquiries to be made into the economic factors of production. The first annual census was taken in 1949 for the year 1948, and obtained, *inter alia*, detailed information on quantity and value of output. Similar detailed censuses were taken in respect of 1951 and 1954, the inquiries for other years being less detailed in character.

C. of P. returns are required from factories and workshops, mines and quarries, building undertakings, public utilities, and gov. depts. In 1907 and 1924 all such undertakings made full returns, but at other completed censuses estabs. employing 10 persons or fewer were exempt. The 1907 census extended to the whole of Ireland, while reports for 1924, 1930, and 1935 included particulars for N. Ireland. The 1948 census was confined to Great Britain, but results for subsequent years relate to the U.K.

The following table compares the gross and net output for 1935 and 1951 in the main groups of industries, viz.: *A. Factory Industries.* (1) Engineering, ship-building, and vehicles; (2) food, drink, and tobacco; (3) textiles; (4) iron and steel; (5) paper, printing, and stationery; (6) other factory industries. *B. Non-factory Industries.* (7) Public-utility ser-

vices; (8) mines and quarries; (9) building and contracting.

In 1951 there were employed on the average 7,627,565 persons in factory industries and 2,520,938 in non-factory industries. In addition to these there were estimated to be 572,194 persons employed by 144,124 small firms, who each employed 10 persons or fewer. The number of estabs. in factory industries employing more than 10 persons was 59,950.

Summary particulars for estabs. employing more than 10 persons were as follows:

Year	Gross Output £m.	Net Output £m.	Persons employed Thousands
1907 *	1,765	712	6,984
1924	3,747	1,548	7,299
1930	3,371	1,504	7,141
1935	3,543	1,640	7,297
1948	12,398	5,039	9,335
1951	18,554	6,601	10,149
1954 †	21,138	—	10,050
1955 †	24,024	—	10,867

* The 1907 census included firms in the S. of Ireland; the figures for that year cover firms of all sizes.

† Provisional figures: net output figures for 1954 and 1955 not yet available.

A full analysis of the results of these C.s of P. has been pub. in the respective final reports. Preliminary results of more recent censuses were published in the *Board of Trade Journal* during the year in which each census was taken.

Production, Ministry of, gov. dept set up in 1942. A minister was appointed to carry out all the duties previously exercised by the production executive of 1941, excepting those relating to man-power and labour, which were transferred to the Ministry of Labour. His duties included the allocation of available resources of productive capacity and raw materials (including arrangements for their importation) and the settlement of priorities, and he negotiated on behalf of the Cabinet with the organisations set up in England and the U.S.A. to deal with assignment of munitions and raw materials among the Allies. The ministry co-operated with the dominions and empire govts. in the general planning of the distribution of raw materials, machine tools, and munitions. In 1945 the M. of P. was merged with the Board of Trade (q.v.).

Production and Productivity. The term production was originally used in the limited sense of making of goods, and is still so applied in everyday life. Modern economic theory has extended the meaning of the term, applying it to all activities which increase the opportunities for consumption, i.e. it includes not only the making of goods but also their distribution; in short it is defined as the creation

Industry Group	Gross Output		Net Output	
	1935	1951	1935	1951
	£m.	£m.	£m.	£m.
A. (1)	549	3,433	289	1,575
(2)	665	3,147	203	543
(3)	443	2,423	157	632
(4)	245	1,467	88	440
(5)	182	899	111	397
(6)	812	4,579	376	1,567
Total A	2,896	15,948	1,224	5,154
B. (7)	266	823	181	452
(8)	187	808	136	466
(9)	214	1,175	99	529
Total B	647	2,606	416	1,447
All Industries *	3,543	18,554	1,640	6,601

* Including gov. depts.

of wealth. The distinction is important, since modern theory shows that there is no justification for the differentiation between 'productive' and 'unproductive' work, the latter referring to distribution and services, since the making of goods is not the end of economic activity—they must be made available to the consumer if they are to render utility.

Production in the limited sense may be individual, batch, or mass production. Individual production still prevails where high craftsmanship and individual finish are required (e.g. bespoke tailoring, handicrafts, etc.). Factory production normally requires that at least a series of similar products is made ('batch' production). Mass production (q.v.) seeks to make the best use of tools and machinery by a continuous flow of standardised production. Modern methods of production have made possible the steadily rising standard of living in the W. world over the last hundred years. Industrialisation and the introduction of modern production techniques are necessary in order to improve conditions in the 'undeveloped' countries.

It is the task of economic policy to see that production keeps up with the demand for goods. If too many goods are produced they cannot be sold, production will be decreased and workers lose their jobs; in other words, there is a slump. If production is not big enough to satisfy demand, 'too much money will chase too few goods,' and there is inflationary pressure. The private manufacturer is guided in his production plans by the prospect for profits; in nationalised industries the same considerations must apply if permanent deficits are to be avoided. Production can be restricted by employers to keep prices high, or by trade unions to keep jobs safe; there was no room for such practices in Britain's post-war economy.

Productivity, indicating the efficiency of production, is measured as production per man-hour, man-day, or man-year. The most reliable indication of productivity is production per man-hour, since production per man-day and man-year is influenced by changes in working hours and duration of holidays. The larger the production per man-hour, the greater the productivity. Productivity may be increased by greater effort on the part of the worker, by better arrangement of the individual operations in the factory, or by increased mechanisation. Productivity as well as production can be increased by the incentive of higher earnings (payment by piece instead of time); they are decreased by high and progressive taxation, especially higher rates for overtime. For increased productivity there may be special bonuses, or public commendation and special awards (as in Soviet Russia). In Britain it was realised during the Second World War that increased productivity depended on the willing co-operation of the workers. Productivity councils in factories, composed of employers and workers, seek to find the

best ways for increasing productivity. The development councils set up by the Board of Trade for a number of industries also dealt with this problem. The Anglo-Amer. Productivity Council, a voluntary body set up by industry in the 2 countries, fostered, with the help of the Economic Co-operation Administration, exchange of information on productivity methods, mainly by visits to the U.S.A. Britain's post-war economic problems would have been greatly lessened if productivity had been greater. See L. Rostas, *Comparative Productivity in British and American Industry*, 1949.

Professional, see AMATEUR.

Professor. Among the Romans this term was applied to certain public teachers. In medieval univs. it signified the possessor of a licence to teach, and was practically synonymous with 'doctor' or 'master.' Such licence was then the only degree granted to students, but later a separate class of recognised lecturers sprang up, to whom the title of P. was applied. The univ. authorities appoint most P.s but the regius P.s at the older univs. are chosen by the Crown. In America the term is used more freely. Permanent univ. and college teaching posts carry the titles: P., Associate P., Assistant P. A full P. who is also chairman of a dept or div. would correspond to the holder of a chair in England from the viewpoint of function.

Profit à Prendre, right, profit, or benefit enjoyed over the land of another, e.g. rights of common, pasture. A P. à P. is to be distinguished from an easement in that the latter is in the nature of a mere convenience or privilege without profit, while the former gives the owner of it a right to something of substance. See also COMMON, RIGHT OF.

Profit and Loss Account, see BOOK-KEEPING, Private Ledger.

Profit-sharing, i.e. the sharing of profits with the general body of employees, has existed in some industrial units for many years. It was defined at an international congress in Paris in 1889, and the Ministry of Labour for many years used the following version of that definition: 'The term "profit-sharing" applies to those cases in which an employer agrees with his employees that they shall receive, in partial remuneration of their labour, and in addition to their wages, a share, fixed beforehand, in the profits realised by the undertaking to which the Profit-sharing Scheme relates.' This definition is still the basis of the statistics gathered by the Ministry of Labour and National Service, although less importance is now attached to the element of disclosed predetermination in arriving at the total share of an enterprise's profits which is to be distributed. In modern industrial practice P. is not regarded in any sense as a direct incentive. In response to the changes in the sources of risk-capital for industry (which have been brought about by the incidence of progressive taxation) the tendency is to retain in the business the money represented by the employee's

share in the profits, issuing instead shares or deposit-certificates (i.e. deferred participation). This development is justified upon the basis that labour has a vital interest in the improvement of the capital investment in most enterprises, for it is this element that holds out the best hope of continued security of employment, and the only substantial hope of continuously improving standards of living. After the experience of long-standing short-time working and unemployment during the depression in the thirties, less is heard now of the once-common suggestion that employees who share profits never share losses. The heaviest burden of industrial losses clearly falls upon the employees, who also suffer in a very direct way from the consequences of inefficient management. The purposes of P. are currently regarded as follows: it demonstrates the goodwill of the management towards the other employees, and the desire to conduct an enterprise as a self-conscious partnership between labour, capital, and management for a common industrial purpose; it provides a natural and unforced basis for the sharing of information with employees. While P. by itself does nothing to secure the co-operation of employees, it suffers from the defect that the annual (or more frequent) payments soon become expected, and are regarded by many employees as part of their remuneration, although this objection does not arise in cases where the share of the profits is issued in other forms than cash (i.e. deferred participation, see above). As an element in co-partnership (q.v.) P. is probably less important than full joint consultation. P. has been promoted as a principle by various groups, including the Rom. Catholic Church (being enjoined in the Papal encyclical *Nonagesimo-anno*) and some political parties, but in industry it has developed largely as the result of the work of the Industrial Co-partnership Association (formerly Labour Co-partnership Association), which was founded in 1884 as a purely industrial society. Such statistical material as exists to indicate the extent of P. in the U.K. will be found under the entry co-partnership. P. has been increasingly popular in the U.S.A. since 1947, where it commonly takes a form that links it with retirement benefits, which in industry in the U.K. are almost always covered by separate and permanent superannuation schemes whose accumulations continue in bad years as well as good. P. is also becoming important in many other countries. In Europe it has advanced under the pressure of political philosophy, but in India it represents a convenient device for remunerating industrial workers in the modern firms without too grave disturbance of the traditional or basic rates paid by the backward firms. In some S. Amer. countries it has been introduced compulsorily, with the result that it operates as a wage increase for those employed in more prosperous enterprises, and is no longer available as a demonstration by management of its

intention to run a business on co-partnership lines. The earlier suspicions of trade unions, which occasionally regarded P. as either directed against them or as a fluctuating substitute for full remuneration, have largely subsided, particularly on account of the importance attached to good relations with the unions which has characterised the attitudes of the most important P. enterprises. There are very many variations in the forms of P. adopted which reflect the hist. of individual enterprises, the stage reached in development of the so-called 'fringe benefits' offered, and the ratio between capital and labour employed, and it is unlikely that any 2 arrangements are completely alike. The most common distributions represent from 5 to 10 per cent of the annual earnings of the workers participating, but there is no figure that can be regarded as 'normal.' In periods when labour is scarce and employers compete to attract workers to their works P. has sometimes been used as an extra inducement, and this has led some employers' federations to ban it. On the other hand, the payment of 'plus-rates,' i.e. wages above the nationally agreed standards, has sometimes militated against the introduction of P. Few, if any, of the early P. arrangements have been able to withstand the effects of inflation, which has in one way or another so altered the basis of calculation originally adopted as to render it unworkable. Uncertainties of this kind have led to the revision of many of the older arrangements, and to the introduction of formulae with greater flexibility than was once deemed desirable. A popular formula, in use in several important enterprises, is the following (it is here expressed in the way in which it is presented to the employees): 'The first charge on the revenues of our business is the wages due to labour. The second is the amounts due to those who supply us the goods and services essential to keep production going. Third comes adequate provision for the replacement of plant as it wears out, the maintenance of premises, and the development of the enterprise. Fourth is some "wage" to capital, calculated at x per cent, the capital being the current worth of the business. What is left is a kind of "surplus profit" which is to be divided between capital and labour (and sometimes management) in a stated proportion.' Distribution of this sum among participants is usually on the basis of the percentage relationship it bears to the total wages bill, and often takes some other form than cash (see deferred participation above). In this formula the 'wage' to capital is not necessarily the dividend paid to shareholders, because it is calculated on current values, while shares are often expressed in nominal values, i.e. those applicable at their issue at some period in the past, when the value of money was higher. See publications (including the quarterly jour. *Co-partnership*) of the Industrial Co-partnership Association, 36 Victoria Street, London, S.W.1.

Profiteering. It is impracticable to pay for modern war by the proceeds of taxation and savings; and belligerent governments, in order to pay their way, have to borrow from the banking system, thus causing the creation of bank-money (demand deposits) and of currency to supplement it. The First World War thus saw the creation of huge quantities of money, while, at the same time, the requirements of total war meant that only a minimum of labour could be spared to produce the goods and services on which the citizen was used to spend his money. Moreover, war imposes new patterns of trade and puts its own restrictions on freedom of competition. In the U.K. the result, in spite of some price-fixing, was a steep rise in prices, a rise that continued in post-war conditions until, with relaxed controls, the peak of inflation was reached in 1920, in which year wholesale prices were treble pre-war. The public saw the rapidly mounting prices and failed to appreciate how largely they were due to inflation. The temptation to put the blame on the shopkeeper or his supplier was irresistible. 'P.' and 'profiteer' (contrasting with 'volunteer') became well-worn terms of abuse to denote the imposition of 'unfair' prices and those responsible for them, the makers of 'undue' profits. To say that monetary inflation was the great cause of the high prices is not to say that no one took advantage of the scarcity of goods and the plenitude of money to make 'undue' gains, whether on consumer goods or in gov. contracting. In the summer of 1919 public concern at rising prices had put the 'P.' Act, 1919, on the statute book. This gave the Board of Trade powers to investigate prices, costs, and profits at all levels, and the assistance of central and local committees, with appeal tribunals.

P. remains as a word of abuse for overcharging or alleged overcharging in general; but the Second World War brought no outburst of protestation comparable to that of the first. There was substantial reason for this. Experience in the First World War was put to good account, and early in the Second World War the Prices of Goods Act, 1939, was passed 'to prevent the price of goods . . . specified by the Board of Trade being raised above the basic price . . . by more than an amount referable to increases in . . . specified expenses,' and giving the Board powers to specify basic prices, permitted increases, and permitted prices. Central and local price-regulation committees were set up. The Act was extended and amended by the Goods and Services (Price Control) Act, 1941, which covered 'services in relation to goods' and gave the Board power not only to fix maximum prices but also to prescribe the marking of goods. Food prices were controlled under Defence Regulations authority, and basic foods, moreover, were heavily subsidised. Despite these thorough-going measures, the Second World War was not conducted without inflation. The Board of Trade index showed a rise of 66·7 per cent over

1938 for the year 1945, with further rises to 72·7 per cent, 89·1 per cent, and 116·2 per cent in the years 1946-8. But these were wholesale prices, and the cost-of-living figures, thanks largely to the food subsidies, were markedly lower—only 31 per cent above pre-war (1 Sept. 1939) for each of the 3 years 1945-7.

It is one of the advantages of a period of relatively stable prices that they tend to become traditional, people feeling that certain prices are inherently 'right' for certain things so that they will not pay more without protest. The tides of inflation wash away the well-known landmarks, the sense of money values becomes blurred and lost, and the citizen making the occasional as distinct from the habitual purchase has often no notion of even approximate current price. Such conditions invite overcharging. The continuing peace-time inflation into the 1950's presented opportunities for P. by all who supplied commodities or services in a seller's market.

Profits. Gross P. for the economist as distinct from the accountant are receipts minus costs. This residue must be broken down to isolate the element of 'pure' profit, the reward for taking the risk of producing for an uncertain market. The remainder is the remuneration for such *entrepreneur* services as planning, organising, integrating the factors of production, etc. Adam Smith was the first to distinguish the interest element in P.: 'The revenue derived . . . from stock [capital], by the person who manages or employs it, is called profit. That derived from it by the person who does not employ it himself, but lends it to another, is called the interest or the use of money. Part of that profit naturally belongs to the borrower, who runs the risk and takes the trouble of employing it; and part to the lender, who affords him the opportunity of making this profit.' Smith also saw that the interest charge included an element of insurance against capital loss. Classical economists developed the analysis of gross profit, and with J. S. Mill there was a clear division of P. into (1) interest, (2) payment for risk, and (3) wages of management or superintendence. Marshall added the service of combining or integrating the factors of production; and later Marshall, like J. B. Clark, came to regard profit as the product of (unforeseen) change, a product which is seen as non-existent in hypothetical conditions of perfect competition with freedom of supply and demand. F. H. Knight emphasised its origin in uncertainty: it arose not so much from change but from the *uncertainty* of change. Pure profit is often negative for particular firms over varying periods, and there is even doubt whether total pure profit is not negative. See F. H. Knight, *Risk, Uncertainty and Profit*, 1933.

Profits Tax, first called National Defence Contribution when introduced by Neville Chamberlain in 1937 as a temporary tax on the profits arising out of rearmament. Imposed for 5 years and

then indefinitely extended in 1942. In 1946 it was decided to retain it as the P. T.

Originally, the tax was a flat rate of 5 per cent on profits of trades and businesses (4 per cent for individuals and partnerships) exceeding £2000. From 1939 to 1946 it was an alternative to Excess Profits Tax (q.v.) and was charged only where the liability exceeded the Excess Profits Tax liability. In 1947 individuals and partnerships were exempted, and distributed profits were charged 25 per cent, with a rebate of 15 per cent for undistributed profits. The rates were changed by the Finance Act, 1951, to 50 per cent on distributed profits subject to a rebate of 40 per cent for undistributed. Till 1952 the tax was allowed as a deduction for income-tax purposes. In 1952 the rates were made 'net'. In 1956 the rates were made 30 per cent on distributed profits, with a rebate of 27 per cent for undistributed profits. The average yield of the tax for the financial years 1953-4 to 1955-6 was £185m.

See EXCESS PROFITS TAX; EXCESS PROFITS DUTY; EXCESS PROFITS LEVY.

Prognathism, term describing the degree of projection of the upper jaw in man and apes. It is greatest in apes and least in Europeans, the Negro type being called prognathous, and the European type orthognathous.

Prognosis (Gk *prognōsis*, knowledge beforehand). In the medical world, a forecast of the probable course, duration, and effect of any disease or injury. An opinion on the nature of the disease, however, is a diagnosis.

Programme Music, term applied to music which is not absolute or abstract but descriptive of something outside itself. The earliest composers attempted musical descriptions of actions and events, and the reproduction of sounds of nature, as, for example, in the battle and weather pieces of Elizabethan virginalists. A more elaborate type of P. M. began with Beethoven's 'Pastoral' Symphony, which attempted to express feelings rather than paint scenery, and continued with the symphonies of Berlioz and the symphonic poems of Liszt, in which emotional and psychological description is more important than representation of physical action. At the turn of the 20th cent. the symphonic poems of Richard Strauss and Elgar's *Falstaff* were outstanding examples.

Progreso, chief port of Yucatán, Mexico, on the N. coast, 25 m. N. of Mérida. There are numerous salt lagoons. The main industry in the area served by the port is the cultivation of henequén (sisal hemp). Pop. 12,000.

Progression, see ARITHMETICAL, GEOMETRIC, and HARMONICAL PROGRESSION.

Progressive Party, see BULL MOOSE.

Prohibition, prerogative order directed to the judge and parties to a suit in an inferior court, commanding them not to go on with it, on the ground either that the court has no jurisdiction in the matter,

or that the proceedings are vitiated by reason of some other irregularity.

Prohibition, in the sense of laws forbidding the sale of intoxicating liquors, is an Amer. conception which afterwards spread to a few other countries. The P. movement in the U.S.A. originated in Maine, where, after a vigorous campaign by Neal Dow, the legislature passed an Act in 1846 forbidding the sale of spirits. In 1851 the legislature passed a further law prohibiting all kinds of alcoholic drinks. By 1855 various full or partial P. laws had been adopted by all the New England states, as well as by some of the states of the N. and middle-W. belts. But in some of these commonwealths the courts declared the laws unconstitutional, and in others they were allowed to become a dead letter. In the eighties the movement was revived, and Kansas became a 'bone-dry' state. In 1898 the Anti-Saloon League was formed, with H. Q. in Ohio. It was backed by influential men in the Methodist, Baptist, and Presbyterian Churches. It also became more scientific than the first would-be reformers. Prohibitionists now demanded the insertion of P. amendments in the constitutions of the various states, with the result that the state courts would not be able to declare P. laws illegal.

The liquor interests of the country, which paid a gigantic revenue to the Federal Treasury, at first did not take this campaign seriously, but they soon found cause for alarm. Amer. public opinion, especially in the country dists. and in the smaller towns and vills., was forming against them. Many states which declined to pass state-wide P. laws adopted a form of local option. Under this a city or a town or co. could vote itself dry. The entry of the U.S.A. into the First World War gave the dry movement enormous impetus. In order to save cereals that could be used for food, Congress enacted laws prohibiting first the manu. of spirits and, later, of beers and wines. These laws were only for the duration of the war. But the reformers said that what was good for war was good for peace. Congress quickly responded to this sentiment, and by Dec. 1917 it had passed a proposed P. amendment to the constitution through both houses by the required two-thirds majority. The law, as passed by Congress, provided that the ratification by the necessary three-fourths of the states should take place within 7 years, and that the enactment should come into force a year after its ratification. Within a very short time three-fourths of the states adopted the amendment. In fact, all but 2 did—Connecticut and Rhode Is. The amendment became operative 18 Jan. 1920. Before this it was necessary for Congress to pass a law defining what was meant by the term 'intoxicating liquors' as used in the amendment. Congress passed this Act in Oct. 1919. It was known as the Volstead Act, after Congressman Volstead, who introduced it.

The Act provided that alcohol, brandy, whisky, rum, gin, beer, ale, porter, wine,

and other beverages containing one-half of 1 per cent of alcohol or more should come within the ban of the law. To manuf., transport, import, export, or sell or barter such was illegal. The law was one which could not be adequately enforced in the large cities. The 'bootleggers,' as the illicit vendors were called, soon came into existence, supplying liquor to those who required it, chiefly Scotch whisky. This was smuggled into the U.S.A. by means of swift motor-boats which effected landings at various places on the long coast-line. There were many cases of death, blindness, and paralysis, caused by people drinking 'Scotch whisky' which was made out of wood alcohol. Even the real Scotch whisky was 'cut'—that is, diluted with more or less harmless ingredients, even water. Gin was made synthetically. Wine was made by securing grape juice from California. But an even more sinister effect of the dry laws was the struggle which went on between gangsters for control of ter. in the big cities where they delivered their bootleg drinks to customers. This led to a contest for mastery between gangs, backed up by their criminal gunmen who did not hesitate to murder, and the forces of law and order seemed helpless. New York, Chicago, Detroit, and other big cities all had their share of this. 'Speak-easies,' places where one might buy dubious drinks at exaggerated prices, were common in all the big cities. The commission of famous lawyers named by President Hoover and headed by George Wickersham to inquire into the questions of law enforcement in the U.S.A. brought in a report favouring the continuation of the 'great experiment' of P., but this was largely nullified by the individual reports made by most of the members. The data of the U.S.A. Dept. of Justice show that over 51 per cent of all the cases heard in the Federal courts in 1930 were for violations of the liquor laws. Just as the question of slavery became the bone of contention in the irrepressible conflict which led to the Civil war, so P. threatened to become a great political question in the U.S.A. It was to the fore in the presidential election of 1928, but although the country dists. were still actively dry in 1930, many of the large cities were becoming ardently in favour of repealing the P. amendment. Finally by the twenty-first amendment, 5 Dec. 1933, the eighteenth or liquor P. of 1919 was repealed. As a result, each state enjoyed complete home rule in the matter of liquor laws. Some states, e.g. Oklahoma, where Baptist and other Church groups were strongly prohibitionist, remained 'dry.' The 'dryness,' however, was modified by the fact that the Federal law was amended to define as 'non-intoxicating' liquors containing less than 3.2 per cent of alcohol. The sale of weak beer thus became permissible even in 'dry' states. Experiments in P. have been made and abandoned in Iceland, Finland, Norway, and in certain provs. of Canada. In the

case of Iceland and Finland the abandonment was due to economic pressure by wine-exporting countries. In the matter of control, schemes of local option have been more successful. In Britain the movement made little impression, yet from 1922 to 1931 Edwin Scrymgeour sat as prohibitionist M.P. for Dundee. Prince Edward Is. adopted P. in 1900 and adhered to the policy until 1947. The Maori ter. in New Zealand (known as the King Country) maintains P., as do the Indian reservations in the U.S.A. and Canada. The grant of dominion status to India and Pakistan was followed by the adoption of P. on a large scale. The Pakistan Gov. enacted a P. law which applied only to Muslims, but the Punjab High Court ruled that such legislation was unconstitutional and that if P. was to be introduced it must apply to all citizens irrespective of race or religion. In both India and Pakistan the P. movement received great impetus from the fact that it accords with the religious teaching of the prin. religions of the 2 countries. In India, 4 states now have complete P., 3 partial P., and 8 have a measure of P. and are extending that measure. The gov. intends to have complete nation-wide P. by 1958, but bootlegging and other causes are working against P. to such an extent that Rajkumari Amrit Kaur, recent Health Minister in the Indian gov., appealed for a repeal of India's experiment in P. On the other hand, King Saud of Saudi Arabia states: 'Wine and narcotics are absolutely and categorically prohibited in our Kingdom.' See also TEMPERANCE.

Projectile. The term is applied to a body which describes a free path through the atmosphere, and the name trajectory is applied to the path. Before considering the general case of P.s a few simple formulae which are used for bodies rising or falling vertically should be understood. If u is the velocity with which a body is thrown vertically, s its distance from the place of projection after a time t sec., and v the velocity with which it is then moving, the following formulae are used: $v = u + ft$, $s = ut + \frac{1}{2}ft^2$, $v^2 = u^2 + 2gs$, where g denotes the increase of velocity each second and is measured in ft per sec. or in cm. per sec. in the c.g.s. system. It is usual to take g as an acceleration of 32 ft per sec. each sec., and this is written in the form, $g = 32 \text{ ft/sec.}^2$ or 32 ft sec.⁻². When g acts in a direction opposite to that in which the body is thrown, the $-$ sign must be given to 32 before substitution in the above equations; when it acts in the same direction the $+$ sign is given, and a well-known example of the latter is the case where a stone is thrown vertically downwards from the top of a cliff. From these simple formulae it is easy to proceed to the case of P.s in which the original velocities are not vertical but inclined at any angle to the horizon. Ignoring the resistance of the atmosphere first of all and taking u as before for the original velocity of the body along the line OP (Fig. 1), where OP is inclined at

an angle α to the horizon, the horizontal component of this velocity is $u \cos \alpha$ and the vertical component is $u \sin \alpha$. The former remains the same throughout the flight of the body, but the latter decreases until the P. reaches the highest point of its trajectory, when it vanishes and then it starts to increase, the motion now being towards the earth. Each velocity can be treated independently, and the formulae

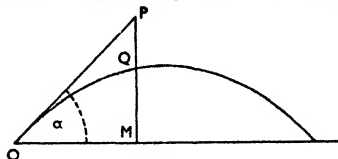


FIG. 1

given above are applicable to the vertical motion of the body, $u \sin \alpha$ being substituted for u . Suppose we want to find the time that the P. takes to reach the earth, reckoning from the instant at the beginning of its flight, then as its height above the surface of the earth at the end of its flight is zero, by making $s = 0$ in the second equation, $t = (2u \sin \alpha)/g$. During this time t the body is moving horizontally with a velocity $u \cos \alpha$, and hence the total horizontal distance R of flight is $u \cos \alpha \times (2u \sin \alpha)/g = (2u^2 \sin \alpha \cos \alpha)/g = \frac{u^2}{g} \sin 2\alpha$. It is assumed that the beginning and end of the trajectory are in the same horizontal plane; if not, that is, if at the end of its path the body struck an elevation or depression, the equation would require modification, but it is unnecessary to consider this case.

From $R = \frac{u^2}{g} \sin 2\alpha$, $\sin 2\alpha = gr/u^2$, and from this it is seen that there are two angles of elevation which give the same horizontal range R . Thus if $\alpha = \pi/4 + \theta$ or $\pi/4 - \theta$, $\sin 2\alpha$ in each case is $\cos \theta$, and a body projected at 2 angles to the horizon, one as much below 45° as the other is above 45° , will have the same horizontal range, although their trajectories are different. Gunners can thus strike objects with 2 elevations, one giving a low trajectory and the other a trajectory for high-angle bombardment. The maximum value for the sine of an angle is 1, and hence the maximum horizontal range for a projectile is u^2/g , obtained by making $2\alpha = 90^\circ$, or $\alpha = 45^\circ$, which shows that the maximum horizontal range of a P. occurs when α is 45° . To find the greatest height attained it is obvious that when this occurs the body has no vertical velocity, and hence $u \sin \alpha$ is substituted for u and c for v in the third equation, from which the expression $s = (u^2 \sin^2 \alpha)/2g$ is easily derived. If α is 45° $s = u^2/4g$, which shows that the maximum range of a trajectory is 4 times the distance of its highest point above the earth. The following considerations will show that the path of a P. is a parabola. If a point Q be taken

anywhere on the trajectory and the co-ordinates of Q be (x, y) (in Fig. 1 these are OM and MQ, respectively, and are referred to axes through O, the x -axis being horizontal and lying in the plane of the trajectory, the y -axis being perpendicular to Ox and also lying in the plane of the trajectory), then $x = u \cos \alpha \cdot t$, $y = u \sin \alpha \cdot t - \frac{1}{2}gt^2$, from which we obtain by eliminating t , $y = x \tan \alpha - \frac{gx^2}{2u^2 \cos^2 \alpha}$, which is parabola. An interesting result is obtained by eliminating α instead of t in the above equations. In this case it is easily seen that $x^2 + (y + \frac{1}{2}gt^2)^2 = u^2 t^2$ ($\cos^2 \alpha + \sin^2 \alpha = 1$), which is the equation of a circle. This shows that if a number of bodies be started off from O with velocity u at different angles to the horizon but all in the same vertical plane, after a time t they will be found on a circle of radius ut with its centre at the point $(0, -\frac{1}{2}gt^2)$, that is, with the centre at a point vertically below O at a distance equal to that through which a body falls in t sec.

Owing to atmospheric resistance the paths of P.s are not exact parabolas, and the greater the initial velocity, the more the trajectory departs from a parabola. Extensive experiments have been carried out for many years to determine the true paths of P.s with various velocities and different shapes, but this subject is too vast to be dealt with in a short article. Rev. F. Bashforth's work with the electric chronograph (1865-70) showed that the resistance of the atmosphere varies considerably according to the velocity. Between 900 and 1100 ft/sec. the resistance varies as v^2 , between 1100 and 1350 ft/sec. it varies as v^3 , and above 1350 ft/sec. as v^4 . With more recent experiments more modern tables than those of Bashforth have been constructed for the use of gunners. The ballistic coefficient C is very important in compiling tables, and standard trajectories for any particular weapon can be computed only when appropriate values of C are known. It is then necessary to fire at various angles of elevation, and then suitable tables can be derived. In addition to the ordinary resistance of the atmosphere account must be taken of the direction of the wind and also of the 'drift,' owing to the gyroscopic action produced by the rotation of the P.s. A rough illustration of 3 trajectories is shown in Fig. 2. C and D are 2 trajec-

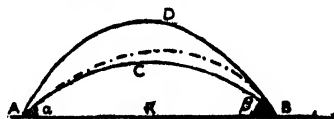


FIG. 2

jectories produced by 2 angles of elevation, one exceeding 45° by the same amount as the other is less than 45° . The broken line shows the real trajectory when atmospheric resistance is taken into account. See *Reports on Experiments*

made with the *Bashforth Chronograph* to determine the Resistance of the Air to the Motion of Projectiles, 1870; F. R. Moulton, *New Methods in Exterior Ballistics*, 1928; T. J. Hayes, *Elements of Ordnance*, 1938; C. S. Cummins, *Everyday Ballistics*, 1950. See also BALLISTICS.

Projection, see MAPS.

Projection Tests, see PSYCHOLOGY.

Prokofiev, Sergei Sergeievich (1891-1953), Russian composer, b. Kkaterinoslav. He studied under Liadov, Wihtol, Rimsky-Korsakov, and Anna Essipova, at St Petersburg Conservatory. He won the Rubinstein prize for his first piano concerto. In 1918 he left Russia, living in Britain, France, Japan, and the U.S.A. before returning to Russia in 1934. The Soviet authorities insisted that he should popularise his music. In 1948, however, it was felt that he had not carried this far enough, and he was accused of showing 'an individualism intolerable to Soviet society.' His efforts at more popular and sympathetic music can be seen in such works as *Peter and the Wolf*, the overture *Toast to Stalin*, and the film music for *Ivan the Terrible* and *Alexander Nevsky*. His operas include *The Love for Three Oranges*, *The Gambler* (after Dostoevsky's novel), and *War and Peace* (after Tolstoy's novel). He also wrote music for ballet and films, 6 symphonies, 2 violin and sev. piano concertos, and many piano works. His music in his earlier years was distinguished by its hard brilliance, his later works showing a mellowing and maturity of style. See L. L. Sabaneiev, *Modern Russian Composers*, 1927, and study by I. V. Nestyev, 1946.

Prokop, Andreas (1380-1434), Hussite leader, b. Bohemia. He became a monk, and travelled widely in Europe. He joined the army of Ziska (q.v.) when the War of the Hussites (q.v.) began, and after Ziska's death in 1424 P. became the Taborite leader. He was a master of strategy, and won a number of notable victories over superior forces of Germans, Austrians, and Saxons. By 1427 he held Prague and controlled Bohemia, and his followers then began a series of aggressive raids into enemy ter. But P.'s radical social beliefs turned the nobility against him, and in 1434 he was killed at the battle of Lipan by an army led by Bohemian nobles. See Count von Lützow, *The Hussite Wars in Bohemia*, 1914.

Prokop'yevsk, city in the Kemerovo Oblast of S. Siberia, in the Stalinsk conurbation 20 m. NW. of Stalinsk. It is the biggest centre of coal mining in the Kuznetak Basin (q.v.) (up to 40 per cent of the whole basin's coal production). Founded in 1918 as a coal-mining settlement, it became a tn in 1931. It has grown partly by absorbing neighbouring settlements and now stretches 15 m. along the railway. Pop. (1956) 260,000 (2nd in Kuznetak Basin; 1926, 11,000, 1939, 107,000).

Prolepais (Gk *pro*, before, *lambanetn*, to take) is a figure of speech in which a

word is used before its sense is due, as in Keats's lines:

'So the two brothers and their murdered man
Rode past fair Florence.'

See also FIGURE OF SPEECH.

Proletariat, or Proletariate, poorer classes of the community. The term *proletarius* was traditionally applied by Servius Tullius (q.v.) to the poorest class of Rom. citizens, whose only wealth was their offspring (*proles*). During the 20th cent. it has frequently been used to denote the wage-earning class. See SOCIALISM.

Proletkult (Russian abbr. for Proletarian Cultural and Educational Organisations), organisation set up by Bogdanovists (see BOGDANOV) in Russia after the Feb. revolution in 1917 with the aim of creating a proletarian culture as a necessary foundation for a socialist revolution. It acquired considerable influence after the Oct. revolution (q.v.) and remained independent of the Communist party and the Soviet Gov. until 1919, when it was integrated with the Commissariat of Education. It was finally abolished in 1924. See G. Struve, *Soviet Russian Literature*, 1951; M. Slonim, *Modern Russian Literature*, 1953.

Prologue (Gk *pro*, before, *logos*, speech), introduction to a play, poem, or discourse. Aristotle applies the term to that part of a tragedy preceding the *parodos*, or first speech of the chorus. The term is also applied to the person who speaks the prologue to a play.

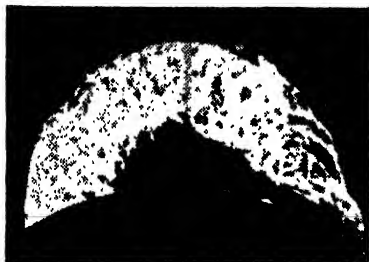
Prome, dist. of Lower Burma, in Pegu div., with an area of 2914 sq. m. The chief tn, P., stands on the Irrawaddy, 161 m. by rail NNW. of Rangoon. The manuf. of ornamental boxes and paper and silk-weaving are carried on. In this dist. are the ruins of the old Pru cap. Sriketra. Archaeologists have discovered there traces of a massive city wall embracing an area larger than that of Pagan or Mandalay. P. fell to the Jap. invaders after the road between it and Rangoon was cut (Mar. 1942). It was liberated by Brit. troops in May 1945. Pop. (of dist.) 436,700; (of tn) 28,300.

Promenade Concerts. Special type of popular orchestral concert, cultivated especially at the Queen's Hall, London, from 1895 until its destruction in 1941, under the direction of Sir Henry Wood, and continued at the Albert Hall. The programmes gradually improved until they contained all the best orchestral music and modern novelties, and a special feature is that the floor of the hall is left bare for people to stand, not to walk about, for which they have neither room nor inclination. Sir Malcolm Sargent and Basil Cameron were joint conductors in 1957. P. C. were not new to London in 1895; they were started by P. Musard at Drury Lane in 1840 and by Louis Julien at Covent Garden about the same time.

Prometheus (Gk 'Fore-thought'), in Gk legend, son of the Titan Iapetus, father of Deucallion and brother of Atlas,

and Epimetheus (q.v.). He stole fire from heaven for man, and warned Epimetheus against receiving Pandora (q.v.) as a gift from Zeus. He was the earliest teacher and benefactor of mankind. Zeus punished his presumption by chaining him on Mt. Caucasus, where an eagle devoured his liver, which was daily renewed, but finally he was set free by Heracles. See Hesiod, *Theogony*, 521-616; *Works and Days*, 54-105; Aeschylus, *Prometheus Vincit*.

Prominences. At the time of a total eclipse of the sun scarlet projections known as P. are seen in various places along the sun's limb. They assume different forms—clouds, fountains, etc., and it is remarkable how often they resemble some of the extinct reptiles of the Jurassic period. These great tongues of flame consist of incandescent gases which extend 30,000 m. and often much



Harvard University Ckmaz Station

SOLAR PROMINENCE

Large eruptive prominence,
4 June 1946.

more from the sun. More than 60 years ago Janssen and Lockyer independently thought of an apparatus which would show them when there was no eclipse, and within comparatively recent times they have been fitted by a special method. On the screen they present an awe-inspiring sight, the enormous tongues rising from the sun and moving out tens of thousands of miles, then falling back on its surface. In some cases they maintain their positions for a time, but in others they change very rapidly. Quiescent P. often reach very large dimensions and remain suspended above the sun's chromosphere for weeks or even months and seem able to float for days without much change in form, in spite of the sun's gravity. Eruptive P. appear with the suddenness of an explosion, and often change their forms so rapidly that in a few minutes after the eruption commences they are very conspicuous. Measurements of their velocities have shown that these sometimes attain nearly 200 m. per sec. A new instrument known as the spectroheliograph (q.v.), invented by Hale of Mt. Wilson Observatory, is now extensively used to study

P. Closely connected with P. are solar 'flares' which have been studied extensively in England by W. H. Newton, Royal Greenwich Observatory, Herstmonceux Castle, Sussex. These are short-lived patches of luminosity which appear in disturbed regions of the sun and which interfere with short-wave radio transmissions. About 20 hours later magnetic storms are sometimes in evidence, or a display of the aurora. The real reason for 'flares' still awaits an explanation.

Promissory Note, unconditional promise in writing, signed by the promisor, to pay on demand, or at a fixed or ascertainable future time, a definite sum of money to, or to the order of, a named person or to bearer (see also **NEGOTIABLE INSTRUMENTS**). No form of words is essential, but an instrument promising to do anything in addition to the payment of money is not a P. N. A bank-note is a P. N. issued by a banker and payable to bearer on demand. An IOU (q.v.), if it contains a promise to pay, may constitute a valid P. N. Where a P. N. runs 'I promise to pay,' but is signed by 2 or more persons, it is a joint and sev. note, i.e. the makers are both jointly and separately liable on it.

Promoter, Company, see **COMPANY**.

Promotion, in the R.N., army, and R.A.F., see **RANK**.

Promotor Fidei, see **ADVOCATUS DIABOLI**.

Pronaos, in a Gk or Rom. temple, the vestibule in front of the entrance-doorway; partly enclosed by columns.

Prongbuck, see **ANTILOCAPRA**.

Proof, in law, means the estab. to the satisfaction of a judge or jury by oral or documentary evidence of the facts alleged in the pleadings (q.v.), though it is also used to denote relevant as opposed to irrelevant evidence (see **EVIDENCE**). In legal slang it is the recognised term for the written or typed evidence of witnesses, prepared by the solicitor for the use of counsel so that the latter may know what a witness is going to be called to prove.

Proof, Burden of (Lat. *onus probandi*). In the law of evidence the general rule is that the burden of proving any fact alleged lies on him who pleads such fact, not on him who denies or 'traverses' it; e.g. if A alleges that he sustained personal injuries by reason of B's negligent driving of a motor car, it is on A to give at least *prima facie* evidence of B's negligence before B can be called upon to give rebutting evidence. The general rule is best expressed in Stephen's words, that the *onus probandi* lies on that party against whom judgment would be given if no evidence were produced on either side. Of course, as a trial proceeds the burden may be, and usually is, shifted from the party on whom it originally rested to his opponent by reason of his proving facts which raise presumptions in his favour. Following the general rule, the burden of proving facts alleged by way of *confession and avoidance* (q.v.) lies on him who alleges such facts; and the

burden cannot be shifted by pleading what is really a *confession and avoidance* in the form of a 'traverse' (q.v.) or direct denial. See also EVIDENCE.

Proof-reader, or Printer's Reader, or Corrector of the Press, one engaged in the work of proof-reading (q.v.), and who plays an important part in a modern printing office. He usually possesses a good general and technical education and is required not only to detect omissions, literal and typographical errors, but must also draw attention to errors of fact, ambiguous statements, and libellous remarks, and ensure that the work is free from errors and inconsistencies. In recent years large printing houses have recognised the reader's aptitude for copy preparation. This work is done before setting the type, and the reader attends to details of house style (see PROOF-READING), and eliminates technical and general queries so that setting may proceed without interruption.

In London printing offices, readers must pass an entrance examination to the Association for the Correctors of the Press, and in the provs. the Typographical Association stipulates trade qualifications. The Prov. Guild of Printers' Readers also has an examining body.

Proof-reading, business of reading through printers' proofs to discover errors for correction. In the early days of print, when type was set by hand, it was customary to correct errors during composition, but since the introduction of mechanical composition the rate of production has increased considerably and it has become necessary to employ trained proof-readers (q.v.).

P. marks, illustrated on pp. 258-9, together with queries to the author, editor, or publisher, are made in the margins of slip or page proofs. Reading is done at all stages of composition as follows: *First proof*, on galley proof, when the reader must ensure that the matter set conforms to copy and is in accordance with instructions of publisher and author. *Make-up* entails revision of first proof and checking page length, headlines, footnotes, etc. *Press reading* in most printing houses is done after the proofs have been passed by the author so that the press reader, who is responsible for the final correctness of work, can be guided by the author's remarks and instructions. Some printers, however, prefer press reading to be done before proofs are submitted to the author. After the compositor has corrected the type according to the marks made the work is *press revised*, and corrections then made are checked on the *machine revise*, which is a proof pulled when the work is sent to the machine for the reader to examine the edges of the pages for type broken in transit to machine. *Foundry revising* is a check on corrections before making a stereo-plate. *Author's revise* is the revising of the author's marks after correction by the compositor.

Newspaper printing is of necessity a speedy process, and the P. is done by the

employment of an assistant or copy-holder reading the copy aloud to the reader, who is thus saved the time of comparing proof and copy. This method is also used by general printers for straightforward copy, but it is always necessary to compare technical and complicated matter.

In order to maintain a uniform style in publs., some printers and publishers set out their preferences in word formations, spellings, capitalisation, and hyphenated and non-hyphenated words in the form of a house style which forms part of the instructions to the printer and assists the proof-reader in avoiding inconsistencies. A well-equipped reference library is essential to a modern P. dept. and should contain Eng., Fr., and Ger. dictionaries, dictionaries of technical, scientific, medical, and musical terms, a gazetteer, a good encyclopaedia, a biographical dictionary, H. Collins, *Author's and Printer's Dictionary*, 1946, and H. W. Fowler, *Dictionary of Modern English Usage*, 1937, or E. Partridge, *Usage and Abusage*, 1947. See also PRINTING.


























Proof Spirit, as defined by Act of Parliament, is such a spirit as shall at a temp. of 51° F. weigh exactly twelve-thirteenths of an equal measure of distilled water, also at 51° F. It contains 57.06 per cent by volume or 49.24 per cent by weight of absolute alcohol. Spirits are termed 'under' or 'over' proof, according as they are stronger or weaker than P. S. Thus 25° over proof means that 100 volumes of the spirit diluted with water would yield 125 volumes of P. S., whilst 20° under proof means that 100 volumes of the sample contain 80 volumes of P. S.

Propaganda (*De propaganda Fide*), name of a Rom. Congregation founded by Gregory XV in 1622 to regulate eccles. affairs in countries where a Rom. Catholic hierarchy either does not exist or is not fully estab.

Propaganda, art of propagating and instilling a belief, particularly a religious or political belief. The word P. is derived from the Congregatio de Propaganda Fide (see above). There is an important distinction between public relations (q.v.) and P. The former sets out to promote mutual understanding which leads to the formation of sound opinion, whereas P. sets out to instil opinions without necessarily explaining the reasons. It is thus a potent weapon for evil if used without thought for truth. Like public relations, P. has been practised since the earliest days, but the advent of radio has made it much easier to beam P. at other nations. Gustave Le Bon was the first to treat systematically the fact that P. was a branch of psychology, especially mass-psychology (1895). His study has since been much elaborated and the conclusions aptly learned, especially by the go. of totalitarian states.

P. may attempt to instil the truth; but since 1918 the word has acquired a normally derogatory and sinister sense owing to the P. methods of Fascist and Communist states. P. uses media similar

<i>Marginal mark</i>	<i>Meaning</i>	<i>Corresponding mark in text</i>
/	Sign to show that marginal mark is concluded	
<i>S/</i>	Delete (take out)	/
<i>stet</i>	Leave as printed	..... under letters or words to remain
<i>caps</i>	Change to capital letters	— under letters or words to be altered
<i>s.c</i>	Change to small capitals	— under letters or words to be altered
<i>caps & s.c</i>	Use capital letters for initial letters and small capitals for rest of words	— under initial letters under the rest of the words
<i>l.c</i>	Change to lower case	Encircle letters to be altered
<i>bold</i> or <i>clat</i>	Change to bold type	~~~~~ under letters or words to be altered
<i>ital</i>	Change to italics	— under letters or words to be altered
<i>rom</i>	Change to roman type	Encircle words to be altered
<i>wf</i>	(Wrong fount) Replace by letter of correct fount	Encircle letter to be altered
⊖	Invert type	Encircle letter to be altered
x	Replace by similar but undamaged character	Encircle letter to be altered
γ	Substituted letters or signs under which this is placed to be 'superior'	Encircle letters or signs to be altered
γ	Substituted letters or signs over which this is placed to be 'inferior'	Encircle letters or signs to be altered
○	Close-up—delete space between letters	○ linking words or letters
#	Insert space	^
≈ #	Make spacing equal	L between words
less #	Reduce space	, between words

<i>Marginal mark</i>	<i>Meaning</i>	<i>Corresponding mark in text</i>
trs	Transpose	 between letters or words, numbered when necessary
centre	Place in centre of line	Indicate position with 
	Indent one em	
	Move to the left	
	Move to the right	
take over	Take letter or word from end of one line to beginning of next	
take back	Take letter or word from beginning of one line to end of preceding line	
//	Correct the vertical alignment	//
	Straighten lines	 through lines to be straightened
n.p.	Begin a new paragraph	 before first word of new paragraph
run on	No fresh paragraph here	 between paragraphs
spell out	The abbreviation or figure to be spelt out in full	Encircle words or figures to be altered
	(Caret mark) Insert matter indicated in margin	
	Insert parentheses	 
	Insert hyphen	
	Insert single quotation marks	 
	Refer to appropriate authority anything the accuracy or suitability of which is doubted	Encircle words, etc., affected

to those employed by public relations: books, pamphlets, the press, radio, television, slogans, films, festivals, and even organised religion. During the Second World War, Brit. P. was largely based on the maxim that unadulterated facts, clearly presented, produced the most lasting effect on their audience, but as in other countries the emotional appeal was not neglected. In the U.S.A. this frequently entailed a certain glorification of war, such as the nation-wide tours made by Hollywood film stars, emphasising the desirability of buying defence bonds to aid the war effort. P. by any party or state necessarily means a marked stress on the value of the idea which it is wished to impart. The Ministry of Information (q.v.) during the Second World War had responsibility for P. in addition to public relations. In Germany, under the direction of Goebbels (q.v.), P. really ceased to have any reliable informative value and became simply the science of moulding opinion to a given belief, by any means available. Emphasis on those who have died for the cause has been an instrument of P. from early times; examples include noted figures such as Edith Cavell or Rosa Luxemburg (q.v.). Goebbels made the recognition of Horst Wessel and other Nazi heroes and martyrs nothing less than a religious cult in which the object of veneration took on a superhuman significance. Such treatment may be compared with the public exhibition of the embalmed body of Lenin in the Red Square, Moscow, by the Soviet authorities. Goebbels employed any lie or distortion of fact to suit his purpose, working on the principle that if a statement was made sufficiently emphatically and frequently it would be believed. His policy achieved a remarkable degree of success in Germany itself, though in other countries where there was access to other sources of information it had little efficacy. Similar P. methods designed to seal off other sources of information have been practised to varying degrees in Communist states. See E. L. Bernays, *Propaganda*, 1928; R. S. Lambert, *Propaganda*, 1938; A. Sturmingen, *Politische Propaganda in der Weltgeschichte*, 1938; E. H. Carr, *Propaganda in International Politics*, 1939; E. Freeman, *Conquering the Man in the Street*, 1940; J. Hargrave, *Words Win Wars: Propaganda the Mightiest Weapon of All*, 1940; P. Quentin, *La Propagande politique*, 1943; L. Fraser, *Propaganda*, 1957. See also ADVERTISEMENT.

Propagation of Plants, see PLANTS.

Propane, see BUTANE.

Propeller, or **Alorscrew**, see SCREW-PROPELLER.

Proper Motion, angular motion in secs. of arc per annum through which any particular star appears to move relatively to the whole stellar universe. The apparent motion is compounded of the real motion of the star, relative to the other stars, and the motion of the sun in space, and the latter must be eliminated to give the proper motion. This can be done only if the star's distance is known.

When P. M.s are large this may indicate that the motions are rapid or that the stars are comparatively close, or both. P. M.s provide statistical information regarding the distances of the stars, but not of individual stars. When a star's distance is known its P. M. gives its velocity in m. or km. a sec., at right angles to our line of sight, that is, its tangential or transverse velocity. Its radial velocity—that is, its velocity in a direction to or from the earth—is found by the spectroscope.

Properties of Matter, see ABSORPTION; AIR-PUMP; BALANCE; BAROGRAPH; CENTRE OF GRAVITY; COMPOSITION OF VECTORS; DENSITY; DYNAMICS; DYNAMOMETER; ELASTICITY; ENERGY; EQUILIBRIUM; FRICTION; GAS AND GASES; GRAVITATION; GYROSCOPE; HARMONIC MOTION; HYDROKINETICS; HYDROMETER; HYDROSTATICS; IMPACT; KINEMATICS; KINETICS; LIQUID; MATERIALS, STRENGTH OF; MATTER; MECHANICS; MOMENTS; OSMOSIS; PENDULUM; PERPETUAL MOTION; RESONANCE; SEA WAVES AND SWELL; SPECIFIC GRAVITY; STATICS; STREAM; VISCOSITY; WATER; WATER MEASUREMENT; PHYSICAL CONSTANTS.

Propertius, Sextus Aurelius (c. 50–16 BC), Rom. elegiac poet, b. Assisium (Assisi), Umbria, of a well-to-do family. After the battle of Philippi his patrimony was confiscated, but he received a good education and afterwards settled in Rome. Here he became deeply attached to the famous 'Cynthia,' a courtesan of Tibur. After her death, however, nothing is known of his life. He is said to have had many literary friends in the circle of Maecenas, including Tibullus, Ovid, and Horace. His extant poems consist of 4 books of about 4000 lines of elegiac verse. Though his work is unequal in quality, no Rom. poet except Catullus so forcibly described the passion of love. His poems are mostly concerned with Cynthia, but the fourth deals with Rom. legend and hist. He was a student of Gk and Lat. predecessors and was influenced by Virgil, Horace, and other contemporaries; and his own influence on the latter is also evident, especially upon Ovid. See *Sexti Propertii Carmina*, ed. H. E. Butler—E. A. Barber, 1933; H. E. Butler (with trans.), Loeb Library, 1912; W. Y. Sellar, *Horace and the Elegiac Poets*, 1892.

Property. P. is either the exclusive right of possessing, enjoying, and disposing of a thing (i.e. ownership as opposed to possession, q.v.), or, by extension, the subjects of such exclusive right. The fundamental div. of P. (in the latter sense) in Eng. law, and indeed in most legal systems, though with a varying nomenclature, is into: (1) things real, consisting of (a) *corporeal* or *immovable* property, i.e. lands, tenements, and hereditaments, and (b) the rights and profits annexed to and issuing out of these, or *incorporeal* property, i.e. rents, annuities, tithes, franchises (q.v.), common rights, advowsons, etc. (see also LAND LAWS, and

REAL PROPERTY); and (2) things personal, consisting of goods, money, and other movables. See also CHATELAIN; CHOSE IN ACTION; PERSONALTY; PERSONAL PROPERTY; TENURE, LAND. For Scots analogues, see HERITABLE AND MOVEABLE; HERITABLE SECURITY.

Prophecy (Gk *prophēta*, feminine *prophētis*) means 'forth-telling,' and not 'foretelling' or 'future-telling,' which in Greece was done by the *mantis*. The term 'prophet' thus means 'interpreter' or 'spokesman,' one who speaks for God or for any deity, as the inspired revealer or interpreter of His will. The common belief that a prophet is *primarily* one who forecasts future events is therefore inaccurate.

Hebrew Prophecy. Anct Heb. had 3 words for prophet: *nābhī*, *roeh*, and *hozeh*. While the last 2 words may conveniently be trans. as 'seer, visionary, gazer,' the exact meaning, origin, and semantics of *nābhī*, the main term for prophet, are still uncertain. In the historical development of Heb. P. 2 main periods may be distinguished, i.e. the earlier one, of which very little is known, terminating in the middle 8th cent. bc, and the following period, which may be considered as the golden age of P. Moses is defined by Jewish tradition as the greatest prophet in Israel (Deut. xxxiv. 10). In the days of the Judges (12th cent. bc), Deborah and Samuel were pre-eminent; Nathan, Ahijah, Shemayah, Eljah, and Elisha are the main prophetic figures in the time of the early kings (11th-9th cents. bc). Some forms of early P. (11th cent.), however, seem to have been somewhat crude and akin to similar institutions in neighbouring pagan nations. Cf. 1 Sam. x. 15. Of the second period we have more information from the books of the prophets themselves, which are now part of the Bible: Amos and Hosea of the N. kingdom (8th cent. bc); Isaiah, Micah (8th cent. bc), Zephaniah, Nahum (7th cent. bc), Habakkuk, Jeremiah, Ezekiel (6th cent. bc), in Judah; Joel, Obadiah, and Jonah, Haggai, Zechariah, Malachi (5th-4th cents. bc). These were the last of the inspired spokesmen for God and humanity, until the coming of John the Baptist, though Anna, a prophetess, is mentioned in Luke ii. 36.

The prophetic books have to be carefully studied in the light of the other books of the Bible, of the contemporary hist. of other nations, and of comparative philology, sociology, and religion. While scholars agree that the prophets lived in the above-indicated periods, the dates and authorship of various chapters are subjects of much controversy.

The Heb. prophets, whose words live with the plea for social organisation and justice, and for religious reverence, and reveal the oneness, omnipresence, and omnipotence of God, remain unique in their majesty. No exact parallel for them has yet been discovered, except perhaps in those great religious teachers of the non-Christian world, Zoroaster, Gautama, and Mahomet. In Israel P.

was a continual phenomenon for cents., a means of growing and cumulative revelations.

Prophylaxis, term for measures taken for prevention of disease.

Propionic Acid ($C_3H_5O_2$), fatty acid occurring in crude pyroligneous acid, and prepared by the oxidation of propyl alcohol with chromic acid. It is a pungent-smelling liquid miscible with water (boiling point $141^\circ C.$).

Propolis, see BEE.

Propontis, see MARMORA, SEA OF.

Proportion may be defined as an equality existing between 2 equal ratios. The ratio between 2 quantities of the same kind is the relation which the one quantity bears to the other, the one being a multiple or part of the other. The ratio of a to b is expressed $a : b$. $P.$ may then be

expressed $a : b = c : d$ or $\frac{a}{b} = \frac{c}{d}$. Sev. results may be deduced from this definition: (1) $ad = bc$; (2) $\frac{a}{b} = \frac{c}{d} = \frac{a+c}{b+d} = \frac{a-c}{b-d}$. The relation (2) is easily deduced as follows:

let $\frac{a}{b} = \frac{c}{d} = k$, then $a = bk$, $c = dk$, $a + c =$

$k(b + d)$, $a - c = k(b - d) \therefore k = \frac{a+c}{b+d} = \frac{a-c}{b-d}$.

A proportion may exist between three quantities a, b, c , of the same kind, $\frac{a}{b} = \frac{b}{c}$.

When a series of quantities a, b, c, d, e, \dots have the property $\frac{a}{b} = \frac{b}{c} = \frac{c}{d} = \frac{d}{e} = \dots$ these quantities are said to be *continued P.* If three quantities are in continued $P.$ $\frac{a}{b} = \frac{b}{c}$, then $ac = b^2$; b is called the *mean*

proportional between a and c and is called the *third proportional*.

Proportional Counter, see GEIGER-MUELLER COUNTER.

Proportional Representation, any system of voting which ensures that political parties or other groups shall secure seats in proportion to their voting strength. Proportional systems are either: (1) the single transferable vote, the P. R. of the Eng. speaking world; or (2) party list systems, common in Continental Europe. All forms necessitate constituencies each electing sev. members.

In (1) the voter must number '1' the candidate he most wishes to elect, and then may number his next-best candidate '2,' the next after that '3,' and so on as far as he pleases. This instructs the returning officer that if the vote cannot help to elect that voter's favourite candidate (either because that candidate already has enough votes or because he has so few as to have no hope of election), it shall be transferred to the candidate the voter has marked '2,' and so on if necessary, until it reaches a candidate it can help to elect. (In practice, most votes are effective for their first or second preference.) The 'quota' necessary to ensure election is the smallest number of votes that must be obtained by each of as

many people as have to be elected, i.e.

$$\frac{\text{total valid votes cast} + 1}{\text{number of seats} + 1}$$

P. R. of parties (or other groups) results because most electors choose to vote first for the candidates of their own party; they may ignore party lines if they wish, and in any case select within the party the particular candidates they prefer. The single transferable vote is used for all public elections in the Rep. of Ireland; other important uses are for the Church Assembly; for univ. constituencies 1918-45; some trades unions, etc., committees; the Australian Senate; the Tasmanian House of Assembly; some Australian and Amer. local councils; and the Malta and Gibraltar Legislative Councils.

The single transferable vote used to fill 1 vacancy is called the *alternative vote*; this is widely used in Australia. Like the *second ballot* (used, for example, in France before 1945), it serves only to eliminate the 'split vote' and is not a form of P. R.

In (2), a party list system, the elector votes for a party, and each party is allotted seats in proportion to its total votes (sometimes, as in Israel, over the whole country, more usually over a city or co.). Sometimes, 'remainders' of votes unused in the constituencies elect further members over a larger area. Seats may be filled by candidates in the order in which they are placed by the party on its list; more often, the voter is given some power to alter this order. Party list systems are used to elect the parliaments of the Scandinavian and Benelux countries, Switzerland and Italy. Germany uses a mixed system, in which the disproportional results of voting by the Brit. system are corrected by addition of members from party lists; France introduced party list P. R. in 1945, but in 1951 modified it drastically to give Communists and Gaullists much less than their proportional share of seats. See also ELECTIONS; ELECTORATE. See G. Horwill, *Proportional Representation, its Dangers and Defects*, 1925; H. Schöchlin, *Die Auswirkungen des Proportionalwahlverfahrens auf Wählerschaft und Parlament*, 1946; E. Lakeman and J. D. Lambert, *Voting in Democracies*, 1955; G. van den Bergh, *Unity in Diversity*, 1956.

Proprietary Medicines generally speaking medicines or drugs manufactured by pharmaceutical firms and which are not advertised for use by the public but which are offered to the medical profession for use in the treatment of disease under medical supervision and under prescription. Chemical research by the pharmaceutical industry has resulted in the production of many drugs which have been outstanding advances in medicine, notably the sulpha drugs and the antibiotics (q.v.). The nature of the drugs is not secret, but the particular pharmaceutical firm which develops and manufactures a particular drug gives it a pro-

prietary name which it patents. Thus one drug may have many different proprietary names which vary according to the maker.

Patent Medicine, in its commonest acceptance, a medicine advertised or offered for sale to the public for the cure of disease. Under the Pharmacy and Medicines Act, 1941, all patent medicines have to be labelled with the complete formula. Patent medicines are usually variants of well-known pharmaceutical preparations, usually diminished in strength, and disguised by the addition of flavouring agents.

Propyl Alcohol (normal), or Ethyl Carbinol ($\text{CH}_3\text{CH}_2\text{CH}_2\text{OH}$), one of the important constituents of fusel oil, from which it is prepared by fractional distillation. It is a colourless liquid (b.p. 97°C ; sp. gr. 0.8 at 20°), miscible with water. Iso-propyl alcohol, or dimethyl carbinol ($(\text{CH}_3)_2\text{CH}\text{OH}$), is an isomer which boils at 82° . It is used as a solvent for essential oils in the perfume industry, and in many industrial processes it can be employed as a substitute for the more expensive ethyl alcohol. It is made commercially as a by-product of the petroleum industry; propylene, C_3H_6 , is obtained by cracking petroleum and is then absorbed in sulphuric acid. On diluting the product with water and distilling, iso-propyl alcohol distils over.

Propylaeum (Gk *propylaion*), in architecture, a monumental entrance gateway to a temple or sacred enclosure. The propylaea of the Acropolis at Athens are especially famous.

Prorogation, as applied to parl. procedure, means the interruption of a session of both houses and its continuance in the succeeding session. A public Bill must be renewed after a P. See PARLIAMENT.

Proscenium, in an auct Gk or Rom. theatre, the space between the back wall (*skēnē*) and the orchestra; in a modern theatre, the architectural frontispiece of the stage, towards the auditorium.

Prose, written expression of thought without, as in verse, any attempt at metrical form. P. and verse (q.v.) are the 2 prin. divs. of literature. In the hist. of every literature poetry preceded P. partly because literature in early times had to be easy to remember and partly because no one troubled to write down the speech of everyday use until such time as speech became organised in the form of oratory. In classical times the art of P. is closely allied with rhetoric; and even historians, such as Thucydides, often used the form of *oratio recta*. P. then was studied as carefully as verse, with a view to declamation, and as the spoken quality of P. is a measure of its success, the definition of Aristotle cannot be bettered—that P. 'must neither possess metre nor be without rhythm' (*Rhetoric*. III. viii. 1). Gk P. set a high standard with such names as Thucydides, Plato, and Demosthenes. Great Rom P. writers include Cicero, Caesar, Sallust, Tacitus, and Livy. The last named introduced tricks of style

which later influenced Macaulay. European P. as a literary medium was late in starting. No old Fr. literary P. goes back much before 1100, and Fr., It., and Ger. P. reaches maturity only with the Renaissance and the Reformation; but O.E. P. of good style exists from as early as the 7th cent. and M.E. P. from the 12th to the 14th cents. 15th-cent. narrative P. reaches excellence with Malory and Berners, while Malory's publisher, Caxton, worked conscientiously towards the raising of the standard of Eng. P. Conscious rhetoric in P. continued, leading, if the exorcism of euphuism is set aside, to the ornateness of Elizabethan P. and the Book of Common Prayer, and to the rhythm of the A. V. of the Bible, the importance of which cannot be over-emphasised in marking the development of Eng. P. from a narrative to a philosophic instrument. But contemporary with the P. of Milton, Jeremy Taylor, and Sir Thomas Browne, Dryden was writing down the speech of the educated 17th-cent. Eng. gentleman, whose habit happened to be good P. This plain Augustan P. of the 17th and 18th cents. was, however, lifted into a grand style, different from that of the Elizabethans, first by Gibbon, then by Johnson and Burke, leading to the Georgian P. of Southey. 19th-cent. P. is varied. The elaborated style was practised by De Quincey and Landor, and among their direct successors stand Ruskin and Kingsley, Pater, and also Swinburne and Morris, not forgetting the exquisite P. of Newman. Morris was the exponent of 'Wardour Street' Eng.—excellent for his particular purposes. In the early 20th cent. P. tended to disintegrate. This was due partly to the lapse of the family habit of reading aloud, and partly to the popularity of the novel, with consequent eye-reading and no ear accompaniment. While the attempts of certain authors to avoid the time element in P. resulted in a controlled incoherence, other writers sustained the high quality of Eng. P., which since the 1930s has achieved an increasingly high level. This revival may be partly due to the increased popularity of radio, where P. readings have brought back an interest in good P., and partly to the high standard set by such writers as Sir Winston Churchill, Lord David Cecil, the Sitwells, Charles Morgan, Rosamond Lehmann, and Rose Macaulay. Amer. P. has developed similarly in the 20th cent., attaining possibly a higher average level than Eng. P., but failing to produce such outstanding individual examples. See G. Saintsbury, *A History of English Prose Rhythm*, 1912; Sir A. Quiller-Couch, *The Art of Writing*, 1916; H. Read, *English Prose Style*, 1928; L. Bergier, *Poesie und Prosa*, 1943; and F. Mosby and J. K. Thomas, *Advanced Prose Interpretation*, 1948.

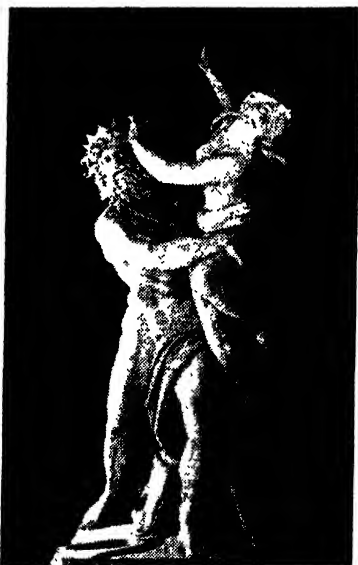
Prosecution, see CRIMINAL LAW.

Prosecution, see MALICIOUS PROSECUTION.

Proselytes (from Greek), converts, especially to Jewish faith. Anct and

Rabbinic Judaism did not deprecate the admission of converts. Indeed, genuine P. were welcomed and highly esteemed. In the early years of the Rom. Empire many Rom. citizens of high rank became P.; and in the 8th cent. AD a large tribe of Tatars, the Khazars, became converts to Judaism and estab. a Jewish kingdom in S. Russia, which was destroyed by the Russians in the 10th cent.

Proserpina, or **Persephone**, daughter of Zeus and Demeter, who was carried off by Hades or Pluto, king of the underworld, who married her. Demeter, in revenge, refused to allow any crops to grow; and men would have died of hunger had not Zeus intervened and persuaded Pluto to let P. go, on condition that she should spend two-thirds (or one-half) of the year with Demeter and the rest with Pluto.



M. Ludovisi

PLUTO AND PROSERPINA

Proskurov, see KIMEL'NITSKIY.

Prosody (Gk *prosdia*), science of versification; that part of the study of language which deals with the forms of metrical composition, including as its 2 divs. accent and quantities of syllables. See METRE; RHYME; RHYTHM; VERSE.

Prosopopoeia (Gk *prosōpon*, face; *poiein*, make), figure of speech whereby an inanimate object is represented with human attributes, or an absent person as speaking or acting. In Spenser's *Prosopopoeia*, or *Mother Hubbard's Tale* an ape and a fox

are shown in human disguises. P. is also used as the equivalent of personification (q.v.). See FIGURE OF SPEECH.

Prospecting, Geophysical, location of geological subsurface features by observations above ground and interpretation of the observations as significant indications of the presence of mineral ores or oil suitable for exploitation, or of bedrock for dams or underground structures. Local deviations from the normal gravitational, magnetic, radioactive, electrical, or elastic characteristics of a region are the subjects of measurements, and a preliminary study of geological maps and profiles and other data available is necessary. Information on the first 3 of the above properties is obtained from surface data; the latter 2 involve some penetration in depth. If the density and structure of the earth were completely uniform, the acceleration of gravity would be constant and directed towards the centre. Any local deviation from the normal value indicates irregular distribution of rocks of different densities, and affects the time of swing of a pendulum and the equilibrium of a torsion balance. These instruments are used in gravimetric P., and the observations reveal anticlines, faults, ridges, and salt domes (see GEOLOGY). Magnetic observations of declination, dip, horizontal force (see MAGNETISM) give information on presence of pyrrhotite and sulphide ores; measurements of electric conductivity reveal general stratigraphy. These three methods are largely used in the search for oil (see OILWELLS). In seismic P. the elastic properties of the rocks are inferred from measurement of the velocity of propagation through the earth of elastic waves originated from the explosion of a charge placed at some depth. The waves are refracted and reflected in the interior like earthquake waves and recorded at points on the surface some distance from the explosion. Radioactive P. is mainly aimed at the location of Uranium, and the Geiger Counter (q.v.) is the usual instrument.

Prospectus, see COMPANY.

Prostate Gland, gland accessory to the male generative organs. It surrounds the neck of the bladder and the commencement of the urethra in man and other mammals. In man it is approximately 1½ in. broad and consists of 2 lateral lobes and a middle lobe. It secretes an important factor of the spermatic fluid. Prostatitis or inflammation of the P. G. is frequently caused by gonorrhoea, and sterility may result. The P. G. is subject to cancer (q.v.), and the fact that cancer of this organ can be successfully treated with the synthetic female sex hormone, stilboestrol, was one of the more important discoveries in cancer research (see CANCER). The P. G. is also subject in older persons to a benign form of new growth known as the adenoma. Adenoma obstructs the free passage of urine and is associated with a chronic retention of a small amount of fluid within the bladder which stagnates and may cause chronic

cystitis (q.v.). The treatment of an enlarged adenomatous prostate consists in surgical removal.

Prostitution, sexual intercourse for the sake of gain on the part of a woman. In early civilisations P. was of religious origin and connected with fertility rites, but soon became a means of profit and exploitation. Promiscuity and P. in themselves are evils which can only be checked by educational means and by the gradual acceptance by all nations of high standards of personal and public morality, and by equal moral responsibility being accepted by both sexes for their actions.

The prostitute has, on the whole, been accepted for many years, even during the Christian era, as a 'necessary evil.' This conception is based on a mistaken and now largely discredited belief in the biological necessity of extra-marital sexual intercourse for most males. It has resulted in incalculable physical and spiritual degradation, both individual and national. With few exceptions the prostitute in all ages has been treated as outside the protection of the law and has suffered persecution and exploitation and often physical injury. Shakespeare through King Lear says: 'Thou rascal beadle, hold thy bloody hand. Why dost thou lash that whore? Strip thine own back. Thou botch'st to use her in that wise for which thou whippst her.' He touches the heart of the problem.

In many countries legislation is directed against prostitutes but not against their clients. The Brit. system of moral legislation is designed to protect the young and the helpless against abuse, to prevent public indecency and all kinds of exploitation, and to provide adequate punishment for such offences, but does not include in the category of crime acts of personal and private P. between mutually consenting adults.

In Great Britain under 3 Acts of the early 19th cent., prostitutes are forbidden to solicit to the annoyance of other persons, but this regulation applies to no other woman. Prostitutes are also the only persons unprotected by law against sexual exploitation by means of fraud or misrepresentation. Licensees under the Licensing Acts are subject to penalties if they knowingly permit their premises to be the habitual resort of prostitutes. Many legal anomalies exist because of these laws, and present-day conditions demand a careful overhaul of their provisions. Legislation regarding the crimes of procuration and defilement is contained in the Sexual Offences Act, 1956. The age of consent to carnal knowledge is 16 years. Brothel keepers, procurers, and men living wholly or in part on the immoral earnings of others, can be punished. On the whole this legislation is successful in punishing and preventing much exploitation of immorality, though it also needs reconsideration. The recommendations of the Wolfenden committee with regard to further legislation were pub. in 1957.

Practical help for women and girls who wish to leave a life of promiscuity or P.

has been for many years the concern of religious and other welfare organisations and is now the subject of international study. Consideration of the problem of male promiscuity, however, lags behind, but is nevertheless of urgent importance. Of recent years much has been done to save young girls from P., notably in Great Britain through the Children and Young Persons Act of 1933, which provides for the protection of young people under the age of 17 in moral danger or in need of care and protection. The recent Children's Act of 1948 gives further power to the State to protect the young. The most callous method of attempting control of P. and its concomitant, venereal disease, is the system of state regulation of P. This system was devised in Napoleonic times and spread rapidly over Europe and to other parts of the world. Briefly, it provides that women who are prostitutes or suspected prostitutes, whether they live in brothels permitted by the State (*maisons tolérées*) or are 'free' (*isolées*) prostitutes, must be on a police register and be medically examined for venereal disease at regular intervals with or without their consent. If infected, the woman is detained in hospital till cured, and then returned to her 'work.' If found uninfected, she is given a card marked to that effect. Under this system, women have no legal status or control over their own bodies, and are completely under the control of the 'morals police' (*police des mœurs*). Their clients are entirely free from all examination or supervision.

An Eng. woman, Josephine Butler (q.v.), began a campaign in 1864, with the help of famous men and women of many countries, to expose the evils and fallacies of this system. She founded the Association for Moral and Social Hygiene (q.v.) in Great Britain and the International Abolitionist Federation abroad, and was a foundation member of the National Vigilance Association. The facts of the degradation of men and women and of youth, the corruption of officials, the medical absurdity of examinations of women only, the false sense of physical security which encouraged and multiplied the use of prostitutes, and finally the proof that the state-regulated brothel inevitably involved the existence of traffickers and *souteneurs* to provide women and girls for the brothels, were gradually realised, and many countries have abandoned the system entirely. France closed the state-regulated brothels in 1948 (though not entirely removing the system), Spain in 1956, Italy is in process of closing them, and in Europe only Portugal keeps the original system, though it has been abolished in her overseas territories.

Since 1904 many nations have worked together to overcome the scourge of the third-party exploiter and trafficker, and have adopted international conventions, each one further extending protection to actual or possible victims of exploitation and providing for the punishment of the offenders. The League of Nations in 1927 undertook an intensive survey into

the problem, which proved beyond all doubt that state regulation of P. encouraged the traffic, and that the traffickers were exceedingly rich and powerful and the network widespread. The United Nations continued the work of the League, and the Fifth Convention for the suppression of the traffic in persons and of the exploitation of the P. of others was in Dec. 1949 adopted by the General Assembly. If this convention is signed, ratified, and implemented by the majority of nations it will protect all persons, male or female, of any age, in any country, against any form of exploitation or P., with or without their consent, and will punish those who profit by the immorality of others.

Other conventions concerning obscene pubs. and narcotic drugs, both closely connected with the traffic, have been adopted in the past, and are still under consideration by the Economic and Social Council of the United Nations. The educational and preventive aspect of the problem of sexual immorality, and the danger this brings to the stability of family life, is the subject of careful study by the United Nations and much information is being collected. The United Nations has granted consultative status to certain non-governmental organisations in this and other fields of work. Among those specially concerned with the problems of P. and traffic in women and children are the International Bureau for the Suppression of Traffic in Women and Children; the International Abolitionist Federation; the International Council of Women; Fédération Internationale des Amies de la Jeune Fille; Association Catholique Internationale des Œuvres de Protection de la Jeune Fille; Union Internationale des Ligués Féminine Catholique; World Y.W.C.A.; Liaison Committee of Women's International Organisations; World Alliance of Y.M.C.A.; International Alliance of Women; St Joan's Social and Political Alliance.

A new inquiry into traffic in persons in the Far E. was contemplated but not carried through. A purely academic survey of the present position, and of abolition's progress, has, however, been completed. The appointment of women police in Great Britain and a number of other countries has been of great assistance in the care and protection of women and young people and in preserving order and decency in the streets. In Great Britain men and women have the same duties and powers, but women police are, of course, especially helpful in the questioning and care of women and girl victims or offenders.

The social conscience of men and women, and hence of govts. all over the world, is becoming wide awake to the evils of promiscuity and P. and their stimulation and exploitation by powerful vested interests. Not only cure but also prevention is being sought, and no factor is being neglected, either economic, social, or spiritual, national, or international. See also VIGILANCE SOCIETIES.

Prostyle, in Gk architecture, a row of columns in front of a temple.

Protagoras (c. 486-c. 415 BC), Gk sophist, b. Abdera. He was the author of a famous saying, 'Man is the measure of all things,' which fairly sums up his teaching; for he taught that there were no absolute standards of truth. This view denies the law of contradiction, and is the subject of an elaborate refutation by Aristotle (*Metaphysics*, III, 5, 6). See D. Loenen, *Protagoras and the Greek Community*, 1946; K. Freeman, *Companion to the Pre-Socratic Philosophers*, 1946.

Proteaceae, family of trees and shrubs, valuable for timber, found chiefly in Australasia and S. Africa. The prin. genera are *Protea*, *Grevillea*, *Banksia*, *Hakea*, *Lomatia*, *Embothrium*, etc.

Protection, in its narrow meaning, is the imposition of a customs duty to impede the entry of foreign goods which compete with home production. In its wider meaning it covers all devices, other than efficiency measures, designed to protect or expand a country's trade and industry (including shipping, banking, and all other services). P. again may be regarded as any practice outside the free trade (*laissez-faire*) doctrine that trade should be free to find its own levels, i.e. that it is to the interest of each and every nation that trade should be uncontrolled by tariffs, bounties, quotas, or similar restrictive arrangements (although, and this is often forgotten, still subject to the general legal and institutional framework of society, so that the term *laissez-faire* is inaccurate or misleading).

The Free Trade case is that to maximise the world's wealth it is necessary to let the principle of specialisation operate to the fullest extent and that this is only possible if all barriers to trade are swept away, including barriers to the movement of men and capital. Under conditions of unrestricted competition the free-trader sees an ideal pattern of world trade. Wherever a trade or an industry is estab., he knows it to be situated in the best possible place, having regard to natural resources, supply of suitable labour, and proximity to markets; its less-efficient competitors, necessarily charging a higher price, having been forced out of business. As conditions change, owing to public taste, inventions, discoveries, improved transport, etc., estab. firms and industries may lose their competitive advantage, yield place to others, and have to turn to alternative employment. Everywhere only the lowest-cost firms will remain in business, and a lowest-cost highest-efficiency world is a world of maximum wealth, permitting the highest standards of living. Since Free Trade gives this ideal pattern of trade and industry, it follows that any interference with freedom to trade, any measure of P., must distort the ideal pattern, i.e. must reduce the field of maximum efficiency and wealth. The Free Trade argument applies not only to the world as a whole, but to any part. While the Free Trade country in a protectionist world cannot hope for maximum

prosperity, yet freedom of trade on its part will give it the best possible trade pattern in the circumstances, the highest standard of living possible in a misguided world. The foreigner's tariff against cheap goods worsens the pattern of world trade; he harms himself and his supplier; but further tariffs can only make matters worse. The protectionist world, for reasons of its own, restricts world trade by shutting out cheap imports; that is no reason why the Free Trade country should restrict trade still further and refuse to take the utmost advantage of cheap production abroad.

Free Trade theory is attractive, and yet P. is practised on all hands. One political difficulty is that Free Trade requires constant adaptation to change. But resistance to change on the part of trade unions and employers has in the past been strong. The problem for statesmanship is to facilitate mobility. The Free Trader tends to rely on the principle that 'imports make exports.' After the Second World War imports did not make exports, since the U.S.A. had a chronic favourable balance of trade with the rest of the world, bending its energies to secure 'scarce dollars.' In these special circumstances it would have been difficult to work a Free Trade policy. Free Traders commonly contrast the advantages of free multilateral trade with the opposite extreme of self-sufficiency. A greenhouse orange is adduced to show the folly of P. In fact, if Free Trade policy represents a country's 'ceiling' in international trade practice the 'floor' is not self-sufficiency, but a policy of reciprocal pacts. Much international trade is between neighbours or otherwise bilateral. Wider than the bilateral pact is the regional pact. A large low-tariff or Free Trade area may be seen as an approach to world Free Trade or as a mean between under- and over-specialisation. In the mid-1950's the countries of W. Europe were discussing the formation of a low-tariff or Free Trade area among themselves, see EUROPEAN COMMON MARKET.

Both the Organisation for European Economic Co-operation and the U.N. trade arrangements and proposals pay great respect to the principle that change should be cushioned. That is an arguable ground on which a case might be made for the P. of committed capital and skills: to slow down and cushion necessary change, not merely because brusque methods are harsh but, having regard to the loss entailed in sudden change, in order to maximise wealth. Even where a case for maximum wealth is not fully made out, some degree of P., perhaps semi-permanent, may well be called in to maximise well-being, with due regard to man's high appraisal of security. Such a policy of slowing and cushioning necessary change seems to go as far as practicable towards meeting the much-pressed demand that wages and standards of living should be (permanently) protected. To protect high costs as such would mean the green-

house orange and the end of international specialisation. At the opposite pole from P. for decaying industries is P. for 'infant' industries, an exception allowed by some Free Traders. On economic grounds a new industry qualifies for P. if it has a good prospect of dispensing with P. after an initial period during which it is sheltered from the price-cutting of old-established rivals. In practice the infant does not always learn to walk on its own feet.

The U.K. turned to Free Trade before the middle of the 19th cent.; but after a period of hesitation Germany and the U.S.A. proceeded to build up their industries behind tariff walls. Long before the end of the century Germany and the U.S.A., followed later by Japan, were making their competition keenly felt. After the early seventies exports per head, which had nearly doubled twice over since 1840-4, began to decline, giving rise in the 1880's to the 'Fair Trade' controversy, and in 1903 to Joseph Chamberlain's Tariff Reform campaign, calling for P. and Colonial Preference. The U.K. could not expect to keep its early predominance for all time, but in fact it was not playing the Free Trade game. A Free Trade country must be a quick-change artist, and trade unions and employers' combinations were helping to make change a slow business. The whole trend over the last hundred years has been against flexibility—combinations of all sorts on the part of both employer and employee—and finally Socialism and planned trade. The First World War and slump of 1930-2 brought measures of P. in the U.K., the slump intensifying protective measures throughout the world. Since the Second World War there has been much talk of multilateralism and bilateralism; and the world looks to international conferences to settle its trade affairs. International machinery professes to aim at freer trade, if not Free Trade, at multilateral trade as against bilateral trade. Free Trade presupposes peace. The early Free Traders saw that Free Trade would render the nations of the world interdependent, and held that such interdependence would be a powerful deterrent against war. The U.N. organisation is out to remedy the great weakness of international trade, the ever-present danger that a slump in one country may be communicated to all. The U.N. aims at measures to prevent a slump in each and every country, individually and collectively. With such machinery, and a prompt willingness to accept the implications of changing conditions, something like the ideal Free Trade pattern of world trade could emerge from the distortions of war. See also CUSTOMS DUTIES; DUMPING; EUROPEAN COMMON MARKET; FREE TRADE; IMPERIAL PREFERENCE; MERCANTILE SYSTEM; SAFEGUARDING; TARIFF REFORM; TARIFFS; TRADE.

See A. Hamilton, *Report on Manufactures*, 1791; H. C. Carey, *Principles of Social Science*, 1858-9; F. List, *National System of Political Economy* (trans.),

1885; W. J. Ashley, *The Tariff Problem*, 1904; W. A. S. Hewins, *Trade in the Balance*, 1924; Sir William Beveridge and others, *Tariffs: the Case Examined*, 1932; L. C. Robbins, *Economic Planning and International Order*, 1937; and United Nations, *National and International Measures for Full Employment*, 1949.

Protection of Ancient Buildings, Society for the, founded in 1877 by Wm Morris, Burne-Jones, Ruskin, and other distinguished men interested in art and letters. At first their energy was directed to checking the custom of restoration of ancient buildings, and particularly of churches; for at that time a reproduction of what was thought or known to have existed was held to be of greater value than the damaged original. As years have passed, the society has become more and more one which is consulted by architects, public bodies, and private persons for advice on the preservation of old buildings of all kinds.

Protection of Ancient Monuments Act enables the owner of any ancient monument to which the Act applies to appoint the Commissioners of Works as guardians of such monument. The commissioners are also empowered to purchase ancient monuments and to appoint inspectors to report on the best mode of preservation. The ancient monuments to which the Act applies will be found specified in the schedules to the Act. A list of scheduled monuments is regularly pub. by H.M.S.O. for the ministry of works. In England some of the most notable are Stonehenge, Old Sarum, the dolmen (Devil's Den), near Marlborough, Uffington Castle, Long Meg, near Penrith, and other stone circles, Kites Coty House, and Banbury Castle. In Scotland, the Brit. walled settlement enclosing huts at Harefauld, the walled fort on Noth Glenelg, and cairns at Minnigaff; in Ireland, various earthworks, cists, tumuli, cairns, and mounds in Meath, Sligo, Donegal, and Down. Provision is also made in the Town and Country Planning Acts for the safeguarding of ancient buildings and monuments.

Protection of Animals Acts are designed to protect domestic and captive animals from cruelty inflicted by man. It is chiefly under these Acts that the R.S.P.C.A. and other animal-welfare societies operate, although the officers of these societies have no legal powers which are not also invested in the public at large.

Protectionist Legislation. The abandonment of Britain's 19th cent. adherence to Free Trade (q.v.) began with the McKenna Duties (q.v.) in 1915. They were repealed by Philip Snowden in 1924, but restored by Winston Churchill in 1925. They taxed imported motor cars, motor cycles and their parts, musical instruments, and cinematograph films by *ad valorem* duty of 33½ per cent. Commercial motor cars were added in 1926, rubber tyres in 1927.

In 1921 the Key Industries Duties, amounting to 33½ per cent and affecting

6538 articles, mainly chemicals and scientific materials, were imposed by the Lloyd George Coalition in the Safeguarding of Industries Act. The Act was augmented on its renewal in 1926.

A series of Safeguarding Duties was introduced in 1925-8 on lace and embroidery, cutlery, fabric and leather gloves, gas mantles, packing and wrapping paper, pottery, enamelled hollowware, and buttons. The usual technique was to tuck these duties into the Finance Act, but cutlery, gloves, and gas mantles were given their own Safeguarding of Industries (Customs Duty) Act.

Special duties on silk and artificial silk, 'permanent until repealed,' were enacted in 1925, and have subsequently been renewed at 4-yearly intervals. Two further specifically protectionist measures were the Merchandise Marks (Imported Goods) Act of 1926 and the Cinematograph Films Act of 1927.

After the economic blizzard of 1929 had crossed the Atlantic from Wall Street and the second Labour Ministry had fallen, the National Gov. won its 'doctor's mandate' to balance the Budget. The Abnormal Importations Act, fathered by Walter Hume, President of the Board of Trade in the second National Gov., in 1931, empowered the Board of Trade to issue orders imposing an *ad valorem* duty not exceeding 100 per cent on a long list of articles.

The Horticultural Products Act, 1931, empowered the Minister of Agriculture to issue orders imposing, for a period of up to 1 year, duties not to exceed 100 per cent *ad valorem* (or according to weight) on various classes of fresh fruit, vegetables, and flowers.

The main instrument of Britain's reversion to Protection was the Import Duties Act of 1932. It brought in a general 10 per cent customs duty on all imports except goods dutiable under earlier measures and about 40 specified on a short free list. The Act set up an Import Duties Advisory Committee to recommend to the Treasury further 33 per cent sur-taxes on luxury goods or on goods 'of a kind which are produced or likely to be produced in the United Kingdom in quantities which are substantial in relation to United Kingdom consumption.' Power was given to the Board of Trade to levy duty with Treasury consent on the goods of any country which discriminated against Brit. exports.

The Ottawa Agreements Act became law in 1932, after 11 Ministers had withdrawn in protest from Ramsay MacDonald's National Gov. It embodied the results of the 7 Inter-Imperial trade agreements which Britain signed at the conclusion of the Ottawa Conference. It ringed the Commonwealth and Empire with discriminatory preferences. See PROTECTION; GENERAL AGREEMENT ON TARIFFS AND TRADE.

Protective Colouring, see ANIMALS, COLOURS OF.

Protector, title formerly bestowed in England upon the person to whom was

entrusted the care of the kingdom during the king's minority, e.g. Lord P. Somerset during the minority of Edward VI. The Privy Council appointed such P.s. Cromwell assumed the title of Lord P. by way of analogy, though in reality he wielded the power of a monarch.

Protectorate, indefinite term denoting primarily and historically a state which has surrendered part of its rights to a protector, remaining in other respects independent. In 1914 the Brit Gov. adopted all measures necessary for the defence of Egypt and the protection of its inhab. and interests, and then in 1922 determined its P. and declared Egypt a sovereign independent state. A distinction must be drawn between states under protection and those under suzerainty. A state under suzerainty is one which being part of the suzerain state has acquired certain of the attributes of international independence, the presumption being that in all other respects it remains dependant. The position of the state under suzerainty does not differ in international theory from that of an individual state in a federal system. Since the dissolution of the Holy Rom. Empire in 1806 states under suzerainty have become rare; although examples are provided by Korea, which was under the suzerainty of China until the war of 1894-5, and by Egypt when under Turkish suzerainty.

To-day the term P. is generally used to describe those assumptions of limited control over, without actual occupation of, the ter. of uncivilised tribes which are a notable feature of the modern partition of Africa. Theoretically sovereignty remains with the protected state or tribe, and the conception underlying the theory of a P. depends for its operation on the protecting power finding a strong political organisation in existence, and where, as in Bechuanaland (1890), no such conditions existed, the theory broke down. A P. in this modern sense is a kind of guardianship, frequently of a backward people by a more advanced race, and recognition of the P. relationship on the part of third states is necessary to enable the superior state to represent the protected state in its foreign relations. Complete annexation has generally followed the proclamation of a P., and mostly in the interests of the protected country. Brit. P.s include Aden P.; the strip of land, including Zanzibar, now included in the Kenya Colony and P. and formerly known as the E. African P.; Bechuanaland; the Federation of Nigeria (except for a small area, including Lagos); Freetown, which has the status of a colony; N. Rhodesia; Nyasaland; Sierra Leone (as distinct from the colony); Somaliland; Uganda; the Brit. Solomon Is. P. International law recognises the exclusive claim of the protecting state together with the correlative duty of responsibility for the security of the subjects of other states within the protected area. It is also the better opinion that native subjects of a protected area, when they are temporarily in other ter., are to be

regarded as subjects of the protecting state. In Brit. P.s the natives are not Brit. subjects but merely 'British protected persons'; in all other respects, administrative and social, these Brit. P.s are indistinguishable from colonies proper. Even in the most backward P. Brit. colonial policy now works for self-government as the ultimate aim.

P.s in the sense of ex-mandated ters. administered under the U.N. trusteeship system, and generally described not as P.s but as trust territories, are placed under U.N. supervision through individual trusteeship agreements. Other colonial P.s belonging to the overseas empires of the administering powers are not under such supervision. Thus Tanganyika, Fr. Cameroons, and W. Samoa are under supervision by the Trusteeship Council, but not Nigeria, Uganda, N. Rhodesia, or the Brit. Solomon Is. P. See COLONIAL TRUSTEESHIP; TRUSTEESHIP COUNCIL; BRITISH COMMONWEALTH; CROWN AGENTS.

Proteins, complex organic substances forming the most important part of animal and plant cells. They consist approximately of carbon 50-55 per cent, hydrogen 6.9-7.3 per cent, nitrogen 15-19 per cent, oxygen 19-25 per cent, sulphur 0.3-0.5 per cent, and occasionally phosphorus and iron. Their molecular weights are large (and for the most part uncertain), and, as a result, P. are colloidal in nature (see COLLOIDS). They are (with a few exceptions) non-crystalline and insoluble in water (except to form 'colloidal solutions'). They are optically active, laevorotatory. Many of them can be 'salted out' from 'solution' by the addition of salts, etc. They can be coagulated by boiling with water, and by the agency of alcohol. P. respond to sev. colour tests such as the *Biuret Reaction*, a test carried out in alkaline solution by the addition of copper sulphate, when a pink colour results. The *Xanthoproteic Reaction* depends on the formation of a white precipitate with nitric acid, which turns yellow on boiling, and orange when caustic soda is added. Other tests are *Millon's Reaction*, *Molisch's Test*, the *Glyoxylic Reaction*, etc. (q.v.).

P. are classified thus: (a) *Simple Proteins*: protamines, histones, albumins, globulins, scleroproteins, glutelins, peratins, gliadins. (b) *(Conjugated Proteins)*: phosphoproteins, haemoproteins, nucleoproteins, mucoproteins. (c) *Protein derivatives*: peptones, peptides, proteoses, metaphosphates, amino acids.

A few examples of common P. are egg-albumin, caseinogen (a phosphoprotein present in milk), haemoglobin (a conjugated protein in blood), salmin (a protamine in salmon roe), gelatin (a scleroprotein). No animal can live if P. are withdrawn from its diet. Certain amino-acids are essential to the body, and must therefore be present in the protein of the food. These essential amino-acids are tryptophane, lysine, histidine, cystine, and possibly tyrosine and arginine. But different P. possess very different effi-

ciencies or 'values.' These values depend on sev. things, e.g. ease of digestion; amount of amino acids produced, etc. In the process of digestion, the P. are split up into peptones, and these into amino acids; the products are carried away by the blood stream to the tissues, where they help to build up new tissues and replace worn-out cells. Any excess is converted by the liver into urea, which is sent to the kidneys for excretion. See FOOD AND FEEDING; BIOCHEMISTRY. See It. Clements, *Modern Chemical Discoveries*, 1954.

Proteles, see AARDWOLF.

Protesilaus, son of Iphiclus and As-tyoche, celebrated for the affection between him and his wife Laodamia (q.v.). He was the first Greek to leap upon the Trojan coast and be killed.

Protestant Episcopal Church, Amer. episcopal church in communion with the see of Canterbury. It was introduced into Virginia on the arrival of the first Eng. colonists, in 1607. When the Revolution began it had gained a foothold in almost all the colonies. It was still, however, under the jurisdiction of the Bishop of London, and had no resident bishops. The movement to gather together under one constitution all the adherents of the episcopal form of government in America began in 1784, but an attempt to secure the consecration of Rev. Samuel Seabury by the Eng. bishops failed on account of some legal difficulty. The consecration was, however, carried out by the Scottish bishops. Three years later the Archbishop of Canterbury consecrated Provost and White Bishops of New York and Pennsylvania respectively. The P. E. C. corresponds to the Church of England in Great Britain, and, while independent of it, there is an intimate fellowship in its administration and form of service. It was founded largely through the efforts of Thomas Bray in Maryland in 1701 as a result of his work in connection with the Society for the Propagation of the Gospel in Foreign Parts. All parts of the U.S.A. are covered by its organisation. In 1956 there were 75 dioceses, 12 missionary dists. in the U.S.A., and 15 abroad. The government of the church is directed by a general convention which meets triennially, consisting of a House of Bishops and a House of Deputies. In 1919 a national council was formed to act during the times when the convention was not sitting. There have been considerable revisions to its Prayer Book in 1789, 1892, and 1928; but it is modelled closely on the Book of Common Prayer used in the Church of England. The membership in 1955 was 3,614,000. The office of the National Council of the P. E. C. is at 281 Fourth Avenue, New York.

Protestantism, term generally but somewhat inaccurately applied to all those who adhere to the principle of the Reformation, whatever may be the differences between them in order or doctrine. The origin of the term is this: At the second Diet of Speyer in 1529, a decree was

received from the emperor forbidding all further action in the direction of reformation until a general council should have met. The decree received the sanction of the Diet, but a solemn protest against it was made by the reformers. This protest, which was not a theological protest, but a legal and ethical one, was joined in by those princes and cities who favoured the Reformation, and hence the term came into general theological use. At first P. denoted the position of the Lutherans as opposed to both Catholics and Zwinglians. Throughout the second half of the 16th cent. the various groups of reformers were almost as bitter towards each other as towards Rome. It was only through the calamities of the first part of the Thirty Years War (1618-24) that they learned to unite under the common name of P. In England, until the end of the 17th cent., the term P. was opposed rather to Puritanism than to Catholicism, but since then it has remained the watchword of those who refuse obedience to Rome. See C. T. Bettany, *History of the Reformation and Modern Protestantism*, 1895; J. P. Lilley, *Principles of Protestantism*, 1898; H. Hoffman, *Der neuere Protestantismus und die Reformation*, 1919; P. Tillich, *Protestantismus als Kritik und Gestaltung*, 1929; W. R. Inge, *Protestantism*, 1935; L. Lambine, *Das Wesen des katholischen-protestantischen Gegensatzes*, 1946; and E. Brunner, *Christianity and Civilization*, 1947. See also INDIVIDUAL CHURCHES.

Proteus, a subject of Poseidon, whose sea flocks he tended. At midday he would recline in the shadow of the rocks with the monsters of the deep around him, and if seized at that time, P. would assume all sorts of shapes to escape prophesying, but if he found his artifices useless, would resume his proper shape and foretell the future (see Homer, *Odyssey*, iv; Virgil, *Georgics*, iv).

Proteus, typical genus of the family Proteidae, contains amphibians of the order Urodela (i.e. tailed forms); the 3 species are commonly known as olms. In length they are about 1 ft, and in colour they are white when in darkness, with red gill-bunches, but in the light they become black. The eyes are completely covered with skin, and their habitat is confined to the subterranean waters of Carniola, Dalmatia, and Carinthia. The fore limbs end in 3 fingers, the hind limbs in 2 toes. Spawning takes place in April, and the eggs are fastened singly to stones. *P. anguineus*, the olm, is the best-known species.

Prothallus, **Prothallium**, or **Gametophyte**, sexual stage of ferns and other cryptogams. The spore, after germination, gradually forms the P., a small green semi-transparent, somewhat heart-shaped scale about 1 cm. in diameter, attached to the soil by root hairs. It bears on the under side a number of pimple-like projections, antheridia, or male organs, and close to the indentation of the heart a cluster of test-shaped bodies, archegonia. These are the female

organs, and each contains an egg (ovum or oosphere). Numerous minute free-moving male gametes (antherozoids or spermatozoids) are liberated from the ripe antheridia, and fertilise the eggs in the archegonia. The fertilised egg (zygote or oospore) develops into a young fern plant, which remains attached to the P. for a time.

Protoactinium, metallic chemical element of highly radioactive character. Symbol Pa., atomic number 91, atomic weight about 235.

Proto-Anatolian, **Proto-Indo-European**, and **Proto-Indo-Hittite Languages**, see INDO-EUROPEAN LANGUAGES.

Protocol (Gk *prōtos*, first, and *kolla*, glue, a sheet glued to the front of a MS. and bearing an abstract of the contents and purport), rough draft or original copy of a gov. dispatch, treaty, or other document. See GENEVA PROTOCOL.

Protocols of the Elders of Zion. In tsarist Russia anti-Semitism (see ANTI-SEMITES) took the form of 'pogroms,' i.e. attacks against the Jews, instigated or connived at by the gov. During the pogrom in Kishinev, 1903, a short form of the protocols appeared in the Russian newspaper *Znaniya*. In 1905 the P. were pub. in full in book form ('edited' by Sergei Nilus); they were repub. in 1907, and were later (especially after the First World War) trans. into German, French, English, Italian, and other languages. The P., to the number of 24 (in one version 27), are supposed to be an authentic report of secret meetings of Jewish elders, who at the first Zionist congress, held in Basel in 1897, conceived a terrible conspiracy to blow up the major caps. of Europe (using for this purpose the underground railways), to destroy the Aryan race and Christian civilisation, and to erect a Jewish freemason world-state. The slanderous forgery was proved by eminent journalists (such as P. Graves in *The Times*, 16, 17, and 18 Aug. 1921) and historians (such as Burteev and Curtiss), as well as by law courts in S. Africa and Switzerland. Graves proved a literary dependence of the P. on a polemic booklet of M. Joly against Napoleon III. See J. S. Curtiss, *An Appraisal of the Protocols of Zion*, 1942.

Protoevangelium Jacobi, or **Gospel of the Infancy**, see APOCRYPHA (2).

Protophages (fl. 330-300 BC), Gk painter, b. Caunus in Caria, but spent most of his time in Rhodes. Apelles (q.v.) is said to have admired his work but to have considered him too imitative of nature. His masterpiece, 'Ialysus,' a picture of the founder of Rhodes, took him 7 years to paint.

Proton, the nucleus of an atom of hydrogen, about 1837 times the mass of the electron or 1.67×10^{-24} gm., and having a positive charge equal in magnitude to that of the electron, 4.802×10^{-10} electrostatic units of charge. It was first identified as the positive hydrogen ion in electrolysis (q.v.) and later found in electrical discharges in tubes containing hydrogen gas at very low pressures (see

MASS SPECTROSCOPY). All nuclei were found to be positively charged, and with masses almost exactly integral multiples (A) of that of the P . It was therefore suggested that nuclei were made up of P . However, the work of Chadwick (1920) on the nucleus (q.v.) showed that the number of charges or Atomic Number (Z) was rather less than half the Mass Number, A . At first it was assumed that the nucleus also contained $A - Z$ electrons to neutralise the charge on $A - Z$ P 's and explain the difference between A and Z . A variety of considerations make this suggestion most unlikely, and it is now held that the nucleus is made up of Z P 's and $A - Z$ neutrons (q.v.).

Protophyta, name for plants of the lowest and simplest organisation, unicellular and microscopic.

Protoplasm, see BIOLOGY and CELL.

Prototracheata, see PENHAPATUS.

Protozoa, great group (subkingdom) of cellular creatures, the simplest and most lowly organised of living animals, and of great scientific interest and importance. The P . are divided into 4 classes: (1) Rhizopoda, or Sarcodina, characterised by the protrusion of protoplasmic pseudopodia (false feet); Amoeba, the Foraminifera, and the Radiolaria (described below) are included here. (2) Ciliata, bearing cilia over the whole, or part, of the body; e.g. *Paramecium* (q.v.), *Vorticella*. (3) Flagellata, with a single protoplasmic whip, or flagellum, used in locomotion; e.g. *Euglena*, and the Trypanosomes, one species of which causes sleeping sickness in man. 4. Sporozoa (q.v.), the members of which are all parasitic in habit, have come within recent years to be of very practical concern, owing to the discovery that such diseases of man as malaria are caused by them. One of the simplest forms of P . is Amoeba, which occurs on the mud at the bottom of fresh-water pools and is barely visible to the naked eye as a tiny white speck. Under the microscope it is seen to be irregularly shaped and composed of protoplasm, a jelly-like material with an external layer, ectoplasm, and an inner, more opaque endoplasm, in which is a round, colourless body, the nucleus; reproduction is of the simplest kind, namely div. of the nucleus and then of the surrounding protoplasm. There is no sexual reproduction, so far as is known. Many P ., though unicellular, attain a wonderful complexity of structure, and it is suggested that some of them are the most complicated and highly organised organisms in the whole animal kingdom. The specialisation is most apparent in the ectoplasm, which commonly becomes stiffened to form a protective pellicle or skin. In the Foraminifera and Radiolaria it deposits calcium carbonate or silica to form a skeleton, and it is these occurring in immeasurable numbers in the ocean which compose the characteristic deposits. In other P . the ectoplasm projects as threadlike or platelike structures capable of movement, and serving

oth to propel the animal through the water and to bring food within its reach. Many P . form colonies whose individual cells are usually complete and capable of separate existence; there is little differentiation into cells of different types such as occurs in the true multicellular animals (Metazoa). See 'Protozoa,' *Cambridge Natural History*, 1906; and L. A. Borradaile, *The Invertebrata*, 1935.

Protractor, instrument in the form of a graduated semicircle, used in setting off and measuring angles.

Proudhon, Pierre Joseph (1809-65), Fr. Socialist, b. Besançon. The son of a brewery workman, he was educ. at the college of Besançon, became a printer and proof-corrector, and taught himself languages; in 1838 he was awarded a pension from the Besançon Academy. In 1840 his first important work, *Qu'est-ce que la propriété?* was pub., which contained his famous maxim, 'Property is theft'—*La propriété c'est le vol*; this was followed by *Système des contradictions économiques ou philosophie de la misère*, 1846. He settled in Paris in 1847, and occupied himself with revolutionary and socialistic propaganda. He was a deputy for the Seine; failed in his foundation of a bank for lending money without interest; escaped to Brussels to avoid prosecution for his attack on the Church, *De la justice dans la révolution et dans l'Eglise*, and died at Passy on his return. P . in his Socialism was an economist and not a politician; his ideal was perfect freedom, equality, and justice, which he found in his conception of political 'anarchy' in its philosophic sense of individual freedom from all rule. He ridiculed the idea of a revolutionary change of society. His ideal was a steady working at the abolition of property, interest, rent, and the other economic factors of estab. society. To him property, like slavery, was the murder of individual freedom. As under the monarchy the king could seize the property of foreigners who died in France, under the *droit d'aubaine*, so the State should treat all property under the same right. A fundamental conception of P 's was that all labour, mental and physical, of high or low class, should be remunerated at the same scale, on the principle that service pays service, and that time is the criterion of value. See lives by C. A. Sainte-Beuve, 1873; J. Duprat, 1929; and D. W. Brogan, 1944; also J. Bourgeat, *Pierre Joseph Proudhon, père du socialisme français*, 1943; H. de Lubac, *Proudhon et le christianisme*, 1945; *The Un-Marxian Socialist*, 1948.

Proust, Marcel (1871-1922), Fr. author, b. Paris. P . was educated at the Lycée Condorcet. His short life was uneventful. Until forced by asthma to lead the life of an invalid, he was received into the stilted Paris society of the nineties. Retiring to a secluded life, he set to work to portray, with immense creative genius in his retrospect, the society he had quitted. The first part of *À la recherche du temps perdu* was pub. in 1913, but the pub. of the second part in 1919, which

was awarded the Prix Goncourt, was more enthusiastically received. P.'s phenomenal reputation, however, has been largely posthumous. His writing exposes and illuminates subtle mental processes in a way that has never been surpassed; his work is unique and he is probably the greatest single influence on the literature of this cent. In *A la recherche du temps perdu* the atmosphere is indefinite, and the story incoherent. P.'s attitude to time and place follows that of Bergson; he recalls every detail of his childhood as if the past still existed, and as if events did not happen but exist, i.e. men come to events, they do not occur. P. denies the existence of the human soul, and sees reason or intellect as only an instrument which constructs simply errors and delusions. He believes that the only real substance of human feeling lies in sensation. Occasionally through the turmoil of sensations comes something possessing a special quality: the physical world falls away and an impression of eternity penetrates into man's feelings. The delusions of time, space, and self vanish: man is in *le temps retrouvé* and has discovered the meaning of life. P.'s importance does not rest on his philosophy alone; his precision of detail has also attracted much attention. He possesses brilliant psychological insight and shows great artistry in his creation of characters and incidents. His novels have a unique poetic quality, every word being carefully chosen and taking a definite place in his pattern. The various novels of *A la recherche du temps perdu* appeared in the following order. They have been trans. into Eng. by C. K. Scott Moncrieff. *Du côté de chez Swann* (Swann's Way), 1913; *L'ombre des jeunes filles en fleurs* (Within a Budding Grove), 1918; *Le côté de Guermantes* (The Guermantes Way), Part I, 1920; Part II, 1921; *Sodome et Gomorrhe* (Cities of the Plain), Part I, 1921; Part II, 1922; Part III, 1923; *La Prisonnière* (The Captive), 1924; *Albertine disparue* (The Sweet Cheat Gone), 1925. S. Hudson trans. *Le Temps retrouvé*, 1927, under the title of *Time Regained*. A recent examination of P.'s papers led to the discovery of some unpub. works: *Jean Santeuil* (3 vols., 1952; Eng. trans. by Gerald Hopkins, 1954), which seems like an early sketch of *A la recherche du temps perdu*; and *Contre Sainte Beuve, suivi de Nouveaux mélanges*, 1954. *Letters to a Friend*, trans. by A. and Elizabeth Hamilton (1950), is a collection of P.'s letters, covering the period 1904-19. See lives by C. K. Scott Moncrieff, 1924; L. Pierre-Quint, 1925; P. Souday, 1927; and C. Blondel, *La Psychographie de Marcel Proust*, 1932; K. Jäckel, *Bergson and Proust*, 1934; S. de Souza, *La Philosophie de Marcel Proust*, 1939; F. C. Green, *The Mind of Proust*, 1949; H. March, *The Two Worlds of Marcel Proust*, 1949; A. Maurois, *Quest for Proust*, 1950; C. Haldane, *M. Proust*, 1951.

Prout, Father, see MAHONY, FRANCIS.

Prout, William (1785-1850), chemist and physician, b. Horton, Gloucestershire. Though his early education had been neglected he took a medical degree at Edinburgh (1811) with a thesis on intermittent fevers. He was admitted L.R.C.P. in 1812 and settled in London. He was one of the pioneers of physiological chem. and discovered (1823) the presence of hydrochloric acid in the gastric juice. But he is chiefly remembered as the originator of 'P.'s hypothesis' (1815), a modification of the atomic theory, which gave an impetus to the exact experimental investigation of atomic weights. It was P. who put forward the theory that hydrogen was the fundamental unit from which all elements were formed.

Provençal Language and Literature. The term P. language may have 2 meanings: (1) indicating the language spoken in Provence; and (2) a synonym of it or *limousin*, which refers to the dialects and the literary language of the whole of the S. of France. P. belongs to the Romance branch of the Indo-European languages (q.v.). At the time when its literature was at its height (12th-14th cents.) the P. language was spoken over a considerable extent of terr., reaching as far N. as the Loire and from the Alps to the Pyrenees. It was one of the earliest of the Romance languages to develop, and in many most important particulars it differed considerably from the N. tongue, the *langue d'oïl*, which political circumstance has made the official Fr. tongue. It is strictly related to Catalan (rather than to French) and it is also much nearer to Latin than the *langue d'oïl*. The chief distinction between the P. language and the language of oïl is that the former retains the Lat. *a* of unaccented syllables, while the latter has softened it to *e*. Thus we have P. *bona* = Fr. *bonne*, P. *amat* = O.F. *amet*, modern *aimé*. The P. language made its appearance in the 11th cent. and ceased to be used for literary purposes by the 15th cent. After 3 centuries of existence as a vernacular, a revival took place. This revival has been carried on principally by a society known as the Félibrige, the purpose of which is 'to bring together and to encourage those who by their writings preserve the language of the land of Oc, and also those scholars and artists who study and work in the interest of this region.' The society was formed in 1854 by 7 poets, Joseph Roumanille, Frédéric Mistral, Eugène Garcin, Théodore Aubanel, Anselme Mathieu, Paul Giera, and Alphonse Taban. On Garcin's secession, his name was replaced by that of Jean Brunet. The association of the Félibres contains poets and writers of the first rank, and they have done much to raise P. to the rank of a literary language. The form of P. which they use is the dialect of Saint-Remy, though many prefer the language of Limousin, which for a certain period was the *romans* of the troubadours. There is an ann. pub. with a wide circulation in the Midi, and sev. of the prin. tns have P.

periodicals. With many Fr. modifications and local differences the P. dialects linger on in S. France, Monaco, the NW. corner of Italy, and the NE. corner of Spain.

The Literature. P. literature contains the earliest fragment of any of the Romance languages, a fragmentary poem, consisting of 257 decasyllabic verses forming the beginning of a longer poem based on Boëthius, *De Consolatione philosophiae*, which dates from the first half of the 11th cent. This is of interest linguistically, but in no other way. P. literature proper begins in the late 11th and the first quarter of the 12th cents. After a period of great prosperity Provence and Catalonia were united in the early 12th cent. under the sovereignty of Raymond-Bérenger, and this union of 2 peoples speaking almost one language gave a fresh impetus to the poetical spirit which must long have been maturing. P. poetry seems, indeed, to us to have had no beginning, no period of tentative strivings after forms and modes of expression. It is first seen in its maturity. The poetry of the troubadours (q.v.) was almost entirely lyrical. Thus almost the whole body of the literature, with a few exceptions, epic works described by Faurier in his *Épopée chevaleresque au moyen âge*, consists of occasional poems remarkable for their wit and sentiment. Rhyme is easy, and so, in order to increase the difficulty and the artistic merit of their compositions, the troubadours made use of the most intricate systems of rhyme. But the very excellence of their form makes the work of trans. almost impossible.

The late 11th-cent. and early 12th-cent. poems of William IX, Count of Poitiers, mainly consisting of love songs, are the earliest extant P. literary remains. The golden period of P. poetry was, however, from 1150 to 1280. Among the famous troubadours of this period may be mentioned Marcabru and the Monk of Montaudon, powerful writers of biting satire; Janfré Rudel, prince de Biala; Rimbaut d'Orange, with whom one of the best of the women poets, Beatrice de Die, exchanged love songs; Arnaut de Mareuil whom Petrarch speaks of as 'the less famous Arnaut,' referring here to Arnaut Daniel, whom Dante also regarded as the greatest of the love-poets (*Purg.* xxvi); Folquet, afterwards Bishop of Marseilles; Girant de Bornell, whom the Provençals themselves have always considered their greatest poet; and Peire Cardinal, one of the greatest of the satirists. These are but a few out of a long list of more than 400. The decay of P. literature began with the Albigensian crusade, and the close association of the 'heretics' with Provence led to their language being banned by the eccles. authorities. By the end of the 13th cent. the true P. literature was weak, though it did not altogether die out. After a century of stagnation, there was a renaissance in the 16th and 17th cents. (Pey de Garros, Louis Bellaut, Claud Brueys, Pierre Goudelin, David Sage, and others).

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Provence, anct maritime prov. of France. It was bounded on the S. by the Mediterranean Sea, and derived its name from the Roin. prov. of Gaul known simply as *Provincia* (the prov.). It included the modern depts of Basses-Alpes and Bouches-du-Rhône, together with some parts of Drôme, Vaucluse, and Alpes-Maritimes. The country was a prosperous one, though it had a varied and troubled hist. during the cents. from the death of Lothair (855) until the death of Count Raymond-Bérenger IV (1245). Its boundaries were continually changing. Its cap. moved from Aix to Arles, with Marseilles as another important city. On the death of Raymond-Bérenger IV the co. passed to his daughter Beatrice; by her marriage with Charles of Anjou it came under Angevin rule. It was during the preceding period, however, under the house of Barcelona, that P. became the seat of that literature which has given the chief celebrity to its name and the chief interest to its hist. (see PROVENÇAL LANGUAGE AND LITERATURE). The hist. of P. during the later Middle Ages was extremely troubled, and P. was drained of her wealth in wars between her Angevin (see ANJOU) kings and their enemies. It was claimed at one time by John of Gaunt. Charles, count of Maine, on his death in 1481, bequeathed P. to Louis XI of France, but it was not finally annexed to the Fr. crown until the next reign (Charles VIII). P. kept some privileges, including an assembly of estates which existed into the 17th cent., and it never became as absorbed in France proper as the other provs. did. P. still retains a most individual character. There are many Rom. and some Hellenic remains around Marseilles. See A. Fabre, *Histoire de Provence*, 1833; T. A. Cook, *Old Provence*, 1905; R. Bernoulli, *Die romanische Portalarhitektur in der Provence*, 1906; E. Caman, *La Provence à travers les siècles*, 1907-30; C. Headlam, *Provence and Languedoc*, 1912; E. Benévent, *Provence*, 1931; and F. M. Ford, *Provence*, 1938.

Proverb (from Lat. *pro*, forth to the world, and *verbum*, word), fragment of folk-literature or, as the Greeks phrased it, 'a wayside saying' (*Paroimia*) embodying a moral lesson or obvious truth. Though, like 'epigram,' it is a word which defies succinct explanation, the essence of its meaning may be gathered from the sum of the following definitions. According to Synesius, Aristotle remarked that 'a proverb is a remnant from old philosophy, preserved amid countless destructions, by reason of its brevity and fitness for

use.' Cervantes speaks of P.s as 'short sentences drawn from long experience'; Lord Russell described them as 'one man's wit and all men's wisdom'; and a profound truth is enshrined in the observation of the Abbé de Saint-Pierre: 'Les proverbes sont les échos de l'expérience.' 'Shortness, sense, salt,' and, be it added, popularity are common attributes of P.s. Sometimes they are alliterative, as the Scottish 'Better a toom (empty) house than an ill tenant,' or the It. 'Traduttori, traditori' (Translators, traitors); sometimes they are rhyming, like 'Haste makes waste.' Often they substitute the concrete for the abstract, as in 'The wine-cup drowns more than the ocean,' which is another way of saying that 'More die from drunkenness than drowning,' and often again they embrace a moral aphorism, as in the biblical 'Whatsoever a man soweth, that shall he also reap,' and the Turkish 'God makes a nest for the blind bird.' Most P.s, moreover, are 'scraps of unfathered wit or wisdom' whose origin is unknown; the stamp of popular approval alone makes a saying, however shrewd, a saw. But there are exceptions to this. 'One butcher can face many sheep' was the comment of Alexander, when his generals described the magnitude of the Persian armies.

The same truth will often be found expressed proverbially but variously in different countries. The Greek equivalent of 'Coals to Newcastle' is 'Owls to Athens'; in the Middle Ages men spoke of 'Indulgences to Rome,' and orientals similarly say 'Pepper to Hindustan.' The Eng. 'gift horse' derives from a Lat. P. quoted by St Jerome: 'Equi donati dentes non inspicuntur,' as also does the medieval rhyming Lat. hexameter, 'Si quis dat mannos, ne quaere in dentibus annos' (If any one gives horses, don't find out their age from the teeth). It has been said that P.s enshrine national traits; there is a Machiavellian ring about 'Revenge is a morsel for God' which betrays its It. origin, and only an Eastern slave could have invented the subtle counsel, 'Kiss the hand thou canst not bite.' In conclusion, it may be observed that adages are as old as the hills, and are common to all languages and people; the Spanish have as many as 30,000, whilst Wander actually estimated the German at 145,000. These concise expressions were especially popular in the Middle Ages and abound in the writings of Cervantes, Rabelais, and Montaigne; but they are in rarer use to-day, though even now we have fresh coinages, such as 'No names, no pack-drill.'

Collections of P.s were made by J. Heywood, 1546, W. Camden, 1614, G. Herbert, 1640, J. Ray, 1670, T. Fuller, 1732, W. C. Hazlitt, 1869, and V. S. Lean, 1902. Standard reference works are G. Apperson, *English Proverbs and Proverbial Phrases*, 1929, *Oxford Dictionary of English Proverbs*, 1936. See also R. C. Trench, *Proverbs and their Lessons*, 1905; H. Pulla-Strecker, *Proverbs for Pleasure*, 1954.

Proverbs, Book of (Heb. *Mishle-Shelomoh*, 'Solomon's Proverbs'; Gk. *Paroemia*, Lat. *Proverbia*), the first and most famous of the Wisdom or gnomic books of the Bible. In the Heb. Bible it belongs to the third div., called *kethubim* or 'writings,' and follows the Book of Psalms. It is rich in language, form, and matter. Tradition ascribes the B. of P. to Solomon, whose name is attached to some chapters (I. 1; x. 1; xxv. 1). We possess collections of Egyptian and Sumerian proverbs from the 3rd millennium, and this makes the antiquity of such collections certain (W. F. Albright, *Archaeology of Palestine*, 1949), and there is a close likeness of some of the material in P. with the recently discovered Egyptian book of wisdom called the 'Teaching of Amen-em-ope,' c. 1000 BC. There is no reason whatever for denying the anc. tradition of the wisdom and the sayings of Solomon (1 Kings v. 9-12). Ch. xxx is ascribed to Agur and ch. xxxi to King Lemuel and to his mother, but nothing is known of either of them. The book is divided by some scholars into 5 sections (I-ix; x-xxii. 16; xxii. 17-xxiv; xxv-xxix; xxx-xxxi), by others into nine parts (xxiv. 23-34 being considered as a separate section, and chs. xxx-xxxi being subdivided into 4 parts).

Providence, port of entry and cap. of P. co. and of Rhode Is., U.S.A., on Narragansett Bay, 40 m. SW. of Boston, Massachusetts. It is noted for manufacturing industries, including jewellery, tools, textiles, yarn, petroleum products, hardware, watches, metal and paper products, wire goods, chemicals, synthetics, paints, and bleaches; textile dyeing and bleaching is carried out, and there are printing works. P. was founded on commerce, but immigration in the early 20th cent., particularly of large numbers of Italians and French, has much altered its traditional New England character. It has many fine public buildings, among them the magnificent State House (1901), the Providence-Biltmore Hotel, the city hall, a Rom. Catholic cathedral, the Union railway station (1897), Butler Hospital, and Brown Univ. (a Baptist institution, founded 1764). Settled by Roger Williams (1636), it contains Roger Williams Park to the S. Much rebuilding followed the hurricane of 1938, which inundated the central part of the city. Pop. 248,674.

Province, in Rom. hist. meant ter. outside Italy under the administration of a governor. The etymology of the word is doubtful, but it was specifically applied to the dist. round Massilia (Marseilles), which, as Rome's first conquest outside the It. peninsula, was known as *Provincia* and which is still known as *Provence* (q.v.). Subsequent conquests were also formed into P.s. The P.s which Caesar found in existence were 14 in number: 7 European—Further and Hither Spain, Transalpine Gaul, It. Gaul with Illyricum, Macedonia with Greece, Sicily, and Sardinia with Corsica; 5 Asiatic—Asia, Bithynia, and Pontus, Cilicia with Cyprus,

Syria and Crete; and 2 African—Cyrene and Africa. Later, Augustus added 3 new ones by the erection of the 2 new governorships of Lugdunese Gaul and Belgia, and by constituting Illyricum a separate P. Several others, including Britain, were added in imperial times. The word P. is now used for the regions or dists. which go to form a federation, in which meaning it is obviously almost interchangeable with state—thus the constituent political divs. of the Canadian federation are called P.s; but those of the commonwealth of Australia are called states; while the constituents of India are still (1950) known as governors' P.s, though some of them, e.g. Bihar, W. Bengal, are now under the new constitution, styled states or member-states of the union of India. Before the Fr. Revolution the word P. was used for the many famous historic dists. into which France was divided before the system of depts took their place (see FRANCE, *Population*). The political divs. of Belgium, Holland, Spain, and many other unitary states are also known as P.s. For eccles. purposes England and Wales are divided into 3 P.s, Canterbury, York, and Wales, each being under the jurisdiction of an archbishop or metropolitan.

Province Wellesley, part of the Federation of Malaya, situated on the W. coast of the Malay peninsula and now considered as part of Penang (q.v.) for administrative purposes. It averages 8 m. in width and 45 m. along the coast. The prov. is extensively cultivated; rice is the most important crop, and sugar, pepper, tobacco, rubber, tapioca, spices, and coco-nuts are produced. P. W. became a Brit. colony in 1798. It fell to the Japanese in Jan. 1941, but was recovered on the Jap. surrender 1945.

Provincias Vaseongadas, see BASQUE PROVINCES.

Provins (anc't Pruvium), Fr. tn, cap. of an arron., in the dept of Seine-et-Marne, on the Voulzie. It has some fine medieval buildings, including the 12th-cent. Tour de César. It is an anc't mkt tn, and is famous for its roses. Pop. 9400.

Provision (law). In the reign of Henry III, besides the older forms of legislation by charter and assize, that by P.s was added, e.g. the P.s of Oxford or ordinances for checking the king's misrule drawn up by the barons under Simon de Montfort in 1258, and those of Westminster, 1259 (re-enacted as the Statute of Marlborough, 1267), exempting knights from jury service, limiting the right of distraint, checking abuse of wardship and succession, etc. From the reign of Edward I legislation was by statute and ordinance. The word P. now means simply a legal or formal statement providing for something, as in the clauses of a statute. A proviso is a qualifying clause in any legal document by which a condition is introduced, generally beginning with the words 'provided that,' or a conditional stipulation affecting an agreement, contract, or grant. Where there is a conflict of meaning between a P. in a statute and a

clause in a schedule to the Act, the P. prevails as being a part of the operative clauses of the Act. See also INTERPRETATION ACT.

Provisional Government was formed in Russia in Mar. 1917 after the abdication of Nicholas II (q.v.) and his brother, and was headed first by Prince Lvov, then by Kerenskiy. Composed of liberals and moderate socialists, the P. G. conscientiously tried to carry out its main tasks—to continue the war and to convoke a Constituent Assembly. Its efforts were frustrated from the left by the Soviets (see SOVIET) and from the right (see KORNILOV). It underestimated the dangers of a Bolshevik coup and failed to deal with them adequately, and was overthrown on 7 Nov. See LVOV; KERENSKIY; OCTOBER REVOLUTION; W. H. Chamberlin, *The Russian Revolution*, vol. 1, New York, 1935.

Provisional Order. P. O.s are issued by gov. depts when a local authority promotes a private Bill. Before granting the order the dept to whom application has been made for it may hold a local inquiry into the matter, and cause full provision to be made for serving notices upon all persons or bodies interested. The Confirming Act (where required) is obtained by the dept itself if the Bill based on the P. O. is unopposed; if opposed the Bill must be supported by the local authority at their own expense. P. O.s can only be made when a statute has been passed which specifically empowers a minister to issue them. They therefore may be regarded as an example of delegated legislation, but are really part of the central authority's pre-legislative work, for they are only provisional until Parliament has passed a Provisional Orders Confirmation Act, giving the force of law to a number of them simultaneously. In the case, however, of a P. O. for a reconstruction scheme under the Housing Acts, confirmation is not necessary unless it is proposed to take lands compulsorily.

Provisions of Oxford, see PROVISION; and MONTFORT, SIMON DE.

Provisors, Statute of. This, a celebrated statute which was passed in 1350, was the culminating point of the remonstrances against the papal pretensions to the disposition of eccles. benefices and, in particular, against the making of provisions or reversionary grants during the lives of incumbents. It maintained the rights of patrons, and threatened all who procured promotion by papal provision with forfeiture and banishment. It was frequently re-enacted in consequence of no less frequent evasions, and later was strengthened by the Statute of Praemunire (q.v.).

Provo, city and co. seat of Utah co., Utah, U.S.A., 37 m. SE. of Salt Lake City. It is a rail, trade, and industrial centre for a rich agric. and mining area. Its chief manufs. are steel and iron products, bricks, tiles, and food products. Silver, lead, copper, and gold are mined in the area. P. is the seat of Brigham Young Univ. Pop. 28,935.

Provost (Lat. *praepositus*, prefect, the chief of a body or community), in Scotland, denotes the chief municipal officer or magistrate, corresponding to the Eng. 'mayor' (q.v.). The P.s of Aberdeen, Dundee, Edinburgh, Glasgow, and Perth are entitled Lord P.s. In France *prévôt* is applied to persons who discharge various functions (marshal, magistrate, mayor, or justice). In England it is apparently restricted to the heads of certain colleges in the univs. of Oxford and Cambridge. There is also a P. of Eton.

Provost-Marshal, commissioned officer specially appointed by the general officer commanding a corps on active service to arrest deserters and other offenders against military law and to carry out the sentences passed by courts-martial. The P.-M. is the chief of the military police in a garrison or camp. The P.-M. General is the head of the War Office branch which controls the corps of Royal Military Police and the Military Provost staff corps.

Proxy (derivation apparently the same as that of proctor, q.v.), agency of a substitute, or by extension the name for the agent himself. Until 1868 in parl. procedure a peer of Parliament could by a crown licence constitute another peer, of the same degree in the peerage with himself, his P. to vote for him in his absence. In company law a P. is a writing authorising a person to vote in place of a shareholder at a certain meeting or at a series of meetings. P.s are also used in bankruptcy proceedings. They are allowed in convocation and in Amer. political conventions. After the Second World War Brit. forces were able to vote by P. at political elections. Marriage by P. is possible in some countries: it was much done in Germany during the Second World War. It cannot take place in England.

Prudential Assurance Company Ltd., The. The Prudential Mutual Assurance, Investment, and Loan Association was founded in 1848 as an ordinary life office; it instituted industrial assurance in 1854, and was responsible for its remarkable development. The company was registered under its present name in 1867 after absorbing sev. smaller companies. In 1919 it began to transact general insurance, fire, accident, burglary, marine, etc., and now has a world-wide business. It has business in one-third of the homes in the U.K. and N. Ireland, and is the largest life office in the Brit. Commonwealth, having branches throughout the Commonwealth. It also has agencies for fire and marine business in the prin. cities of the world, and a subsidiary fire office in New York. In 1912 the P. A. C. first introduced the 'block' system to centralise the collection of premiums, a system since widely adopted in the U.K., U.S.A., and France. In the 2 world wars the company subscribed largely to gov. loans, and it has over 85 per cent of its funds invested in the U.K.

Prudentius, Aurelius Clemens (AD 348–c. 405), b. in Spain, a contemporary of

Ambrose, Augustine, and Jerome; wrote hymns and poems on religious subjects, such as the *Cathemerinon* and *Psychomachia* (a religious allegory), and is regarded as the foremost poet of the early Lat. church. See eds. of T. Obbarius (1845) and H. Dressel (1860). Also lives by J. P. von Ludewik, 1892; H. Brookhaus, 1872, and J. Bergmann, 1921; E. Faguet, *De Prudentii Carminibus*, 1883; F. St J. Thackeray, *Translations from Prudentius*, 1890; G. Boissier, *La Fin du paganisme*, 1898; and T. R. Glover, *Life and Letters in the Fourth Century*, 1901.

Prudhoe, vil. and urb. dist of Northumberland, England, situated on the S. bank of the Tyne, 10 m. W. of Newcastle, and about the same distance E. of Hexham. There are the ruins of a Norman castle built 1161–82 by Odinel de Umfrerville, on the site of a Brit. fort. It later belonged to the Percys. About 60 per cent of the employable labour is engaged in coal mining. The remainder are occupied in agriculture or brick manuf., or on work in the large fertiliser factory built in 1941. Thomas Bewick, the engraver, was b. in the dist. Pop. 9750.

Prudhomme, René François Armand Sully, see SULLY-PRUDHOMME.

Prud'hon, Pierre Paul (1758–1823), Fr. historical and portrait painter, b. Cluny and educ. at the Dijon Academy and in Italy. He won the Grand Prix de Rome (1782), where he resided till 1789, becoming a friend of Canova. His chief works include 'Justice and Divine Vengeance pursuing Crime,' 1808 (Louvre); 'Rape of Psyche,' 1812; 'Interview between Napoleon I and Francis II after Austerlitz,' and 'The Empress Josephine.' He also decorated the Louvre with ceiling paintings. See lives by C. Clément, 1872; C. Martine, 1924; lt. Régamey, 1928; J. de Goncourt, *L'Art du XIX^{ème} siècle*, 1882; and E. Hildebrandt, *Die Malerei und Plastik des 18. Jahrhunderts in Frankreich*, 1924.

Prune, dried plum, and also the name of varieties of plum-trees which are cultivated as being specially suitable for drying on account of their firm texture. Large quantities, mostly sun-dried, are imported into Britain, although it has been demonstrated that Brit.-grown fruit dried by artificial heat in specially constructed drying stoves compares very favourably with the imported fruit. The art of plum drying is most highly developed in California and more than a third of the imports are derived from that state; but the finest quality comes from France, where the fruit is boiled immediately after gathering and then when cool is exposed to the sun in trays until thoroughly desiccated. P.s are valuable for their laxative qualities.

Prunella, or **Prunello**, smooth black or purplish woollen stuff used for the uppers of gaiters and shoes, or as 'lasting,' formerly also for clergymen's and barbers' gowns.

Prunellidae, see ACENTOR.

Pruning, art of regulating plant growth by cutting away superfluous and unwanted shoots and branches with the object of (1) regulating the shape, and/or (2) increasing the production of flowers or fruit. P. tools (knife, sécateurs, or saw) should be sharp so that they leave clean-cut surfaces, edged with healthy bark intact so that they callus over quickly. Large cut surfaces, following the removal of big branches, should be protected from weather and fungus infection by a dressing of Stockholm tar, white lead paint, or a proprietary tree antiseptic. P. cuts should be made immediately above a suitably placed bud or lateral shoot, or flush at the base of the junction with a larger branch. Otherwise any stub will only die back and invite disease. Severe P. encourages wood growth; light P. fosters development of fruiting wood. Therefore, where new wood growth is required, P. should necessarily be severe. When trees are young, P. for fruit must be subordinated to P. for wood growth in order to build up the branch framework of a well-balanced tree and to form a shapely specimen. In later years P. is less severe and is devoted to the removal of diseased or weak growth, to the keeping of the branch work open to air and sun, and to the renewal and formation of fruiting wood. Apples and pears are pruned on similar lines. Winter P. may be carried out at any time while trees are dormant, usually before the winter spraying is done. There is no single ideal P. system. The growth habit of individual varieties must be studied. Some varieties bear on fruit spurs along the branches, some at the tips of shoots as well. The type of tree, its root-stock, and its manuring and performance during the previous season also influence the amount of P. needed. Generally weak growers can be pruned more severely than strong ones. Winter P. largely consists of shortening leader shoots and cutting back laterals more severely, and, in the case of mature fruiting trees, of thinning fruit spurs and developing renewal fruit-bearing wood. Root P. is carried out when young trees of 5-6 years fail to respond to top P. by fruiting, and is done in Nov. Summer P. is a distinct operation; chiefly essential on cordon, dwarf pyramidal, and wall-grown trees, and usually consists of restricting tip growth of the current season. The Lorette system of P., developed by Louis Lorette, of Wagonville, France, aims at the forced development of fruitbuds by consistent severe P. throughout spring and summer, with no winter P. It is particularly suited to pears, producing heavy crops, but more practical for amateurs than commercial growers.

Various Fruits. Apricots fruit on the current season's and on mature wood. P. is done in the growing season with the object of keeping up an abundant supply of wood growth. Cherries, once framework is estab., are pruned in July, though orchard trees need little P. Peach and nectarine may be pruned in Feb. to

induce growth of framework wood, and renewal fruiting wood when trained indoors or on walls; in April out of doors for bush trees, and again in autumn. Plums (including damsons) need little P. when desired shape is estab. Any cutting-out of branches is best done in June or July to avoid silver-leaf infection. Blackcurrants, after the third year, are pruned by cutting out about one-third of the older branches at ground level during the winter, to maintain a steady supply of renewal fruiting wood. Red and white currants are pruned by methods similar to those used in the case of apples, by cutting laterals back to within 2 buds of the base in winter or spring. Brambles (loganberry, raspberry, hybrid berries) require the fruited wood cut away at soil level in late autumn, with new canes to take their place. Blackberries only need dead wood and old wood cut out, and thinning. Figs need surplus suckers and shoots removed in autumn. Gooseberries may be spur-pruned as red currants or allowed to develop long shoots and merely thinned in winter. Nuts need P. in winter to thin out old wood, and in summer when side shoots are shortened to about 5 leaf buds.

Ornamental Trees and Shrubs. Deciduous trees are best pruned between early June and Dec., though most may be pruned in winter. Maples, birches, and walnuts bleed if pruned in late winter or spring; stone fruits like cherries should be pruned before mid July. Evergreen trees and shrubs are best pruned in April or May. Flowering shrubs are pruned according to their habit of growth. Those which produce their flowers on new wood ripened the previous year are pruned as soon as the flowers fade; those which produce their flowers on older, mature wood are pruned in Feb., but most shrubs need no regular P. Roses are pruned according to their type. Tea, Hybrid Tea, Hybrid Perpetual, Pernetiana, Polyantha, and climber tea roses are best pruned in March or April. Other climbing roses are pruned just after flowering, while ramblers are pruned according to whether they flower on new or old wood. Most climbing plants may be pruned in Feb. of Mar., though flowering kinds such as Lonicera and Wistaria are also pruned after flowering. See also GARDENING.

See H. Dunkin, *The Pruning of Hardy Fruit Trees*, 1934; S. B. Whitehead, *Fruit from Trained Trees*, 1954.

Prunus, genus of deciduous and evergreen trees and shrubs (family Rosaceae), bearing racemes of white or pink flowers, followed by drupeaceous fruits with a smooth stone. Almonds, peaches, apricots, plums, and cherries belong to the genus. Other species include *P. Padus*, bird cherry, a handsome Brit. tree often grown in shrubberies, and *P. laurocerasus*, the cherry or common laurel.

Prus, Bolesław (1847-1912), Polish writer, real name Aleksander Głowacki. He was imprisoned for taking part in the rising in 1863, and later worked in a factory before devoting himself entirely

to literature and journalism. Among his important works are *Placówka*, the story of a peasant's struggle to keep his land from the Germans; *Lalka*, social novel describing middle-class life in Poland; *Emancypantki*, a novel about the newly emancipated woman; and *Paroan* (Eng. trans. *The Pharaoh and the Prince*), about ant Egypt.

Prussia (Ger. *Preussen*), former name of a region in N. Europe. The area has varied considerably in size and political construction at different times. It has been: (1) the ter. of the Borussi, heathen tribes of Slav origin, covering regions on the E. bank of the R. Vistula, as well as the whole of the later prov. of E. P.; (2) 1701-1866, a Hohenzollern kingdom, ruled by the family which had previously been electors of Brandenburg. A section of it lying between the R. border of Pomerania and the R. Elbe, was part of the Holy Rom., later Austrian, Empire; (3) 1866-1918, the largest and most influential Ger. state. The term was expanded to cover all the conquests made while Bismarck was in power. This meant that it applied to almost all N. Germany; (4) 1918-45, the remnants of (3) left to Germany after the peace treaties following the First World War. The last P. was a rep.

The rep. of P. in 1935 had an area of slightly more than 113,000 sq. m. By the treaty of Versailles (1919) and the div. of Silesia P. had been deprived of 21,646 sq. m., but had received as an addition the principality of Waldeck in 1929. It comprised the greater part of N. Germany, bounded on the N. by the Baltic, Mecklenburg, Denmark, and the N. Sea; on the S. by Thuringia, Saxony, and Czechoslovakia; on the E. by Poland; and on the W. by Belgium, the Netherlands, and Luxembourg. The pop. of P. in 1935 was 40,745,000. It was divided into 15 provs. of which one was the cap., Berlin. Other large cities were Cologne, Breslau (now Wrocław), Essen, Frankfurt-am-Main, Dortmund, Düsseldorf, Hanover, Duisburg, Wuppertal, Gelsenkirchen, Bochum, Magdeburg, Königsberg (now Kaliningrad), Stettin (now Szczecin), and Kiel. About three-fifths of the rep. consisted of lowland and belonged to the Great N. European plain. The SE. was the more mountainous portion. The Sudeten chain separated P. from Austria and Bohemia and included the Riesengebirge with Schneekoppe (4929 ft.), the highest mt in P. The land, drained by the R. Vistula, Oder, Niemen, Elbe, Weser, Ems, and Rhine, possessed a good canal system, much of it constructed at the beginning of the 20th cent. The coast-line was over 1000 m. long and possessed most of Germany's important seaports, excepting Hamburg, Lübeck, and Bremen.

Education and Religion. Education was compulsory, and attained a high standard on the technical side. The largest Prussian univ. was at Berlin, and the next in size were Breslau, Bonn, Göttingen, and Halle. In 1935 rather less than two-thirds of the pop. was

Protestant, the rest being Rom. Catholic, with a Jewish pop. of about 400,000. This last was practically exterminated by Hitler.

Constitution. After the abolition of the monarchy a Prussian constituent assembly was elected by universal suffrage in 1919. A republican constitution was adopted. P. was governed by a Cabinet appointed by a premier who was elected by the Diet, which itself was elected for 4 years by universal suffrage on a basis of proportional representation. The *Staatsrat* (State Council) was an advisory body, consisting of representatives from the provs., elected on the basis of 1 to every 50,000 inhab. For local gov. the 15 provs., each under a governor, were divided into gov. dists. under a president, rural circles under elected deliberative assemblies, and urban circles under a burgomaster. When the National Socialists seized the gov. of P. in Jan. 1933, the constitution was abrogated and popular gov. and the Diet abolished. P. was put under the absolute rule of a *statthalter* (governor), who appointed his own Cabinet. Hitler (q.v.), the Ger. chancellor, was *statthalter*; while Goering was Prime Minister. Ironically the liquidation of P., formally decreed by the Allies after the Second World War, was prepared by the Nazi regime, though for an entirely different reason.

History. The kingdom of P. grew out of Brandenburg, conquered from Slav tribes in the 10th cent. by Otto I. Henry the Fowler estab. it as a frontier unit, a mark, to guard the line of the Elbe against the Wends, in the belt of forest and marshy plain which stretched unbroken across to Russia. From the Elbe the mark extended E. in the later Middle Ages to and across the Oder, its progress facilitated by the arrival of Ger. colonists from the W. It carried with it Christianity and a feudal organisation of Ger. lords over Wendish serfs, which long characterised it. As an electorate the mark passed in 1415 to the Hohenzollerns (q.v.). The country was poor and barren, surrounded by rival states, but Hohenzollern rule, under a succession of capable and ruthless electors, was steadily consolidated. At the Reformation P. became Protestant. The elector gained much from the secularisation of property at this time. In the 13th cent. the military order of the Teutonic knights conquered and Christianised the pagan Borussi, in the SE Baltic, but had then declined before the advancing power of Poland. In 1525 this ter., E. Prussia, was declared a secular duchy by the grand master of the Teutonic Order, Albert of Hohenzollern, under Polish suzerainty. In 1614 Brandenburg gained the duchies of Juliers and Cleves by inheritance, and in 1618, on the death of the Duke of P., P. and Brandenburg were united under a single Hohenzollern (but still under Polish suzerainty). Under Frederick Wm, the Great Elector (1640-88) (q.v.), Brandenburg-Prussia became a leading European power. Frederick William, more than any other,

gave the Prussian monarchy its specific form and character. Energetic, opportunist, and totally unscrupulous, he built the 2 bastions of the monarchy, the standing army, and the efficient, centralized administrative system. At the peace of Westphalia he secured part of Pomerania and additions to Brandenburg in the SW., across the Elbe. His armies defeated the French and the Swedes, while out of Swedish conflicts with Poland he secured the complete independence of E. Prussia from Polish suzerainty. Frederick William's son, Frederick I, King of P. (q.v.), raised his country to the status of a kingdom, crowning himself at Königsberg in 1701. His title was a Prussian and not a Brandenburg one, since the emperor insisted, for reasons of prestige, that the royal title should be associated with Hohenzollern territory beyond the boundaries of the empire. Frederick II the Great (1740-86) (q.v.) used the army collected by his father to take Silesia from Austria, and, in the first partition of Poland, gained W. P., thus linking his previously scattered territory. He also encouraged economic reforms. His Silesian policy inaugurated the struggle for supremacy in Germany between Hapsburg and Hohenzollern which ended in Prussian victory in 1866, and destroyed the existing balance in Europe. In the Seven Years War (1756-63) P. was attacked by Austria aided by Russia and France, but survived very largely because of the subsidies supplied by her new ally, England. Then onwards, until the outbreak of the F. revolutionary wars, P. enjoyed a period of peace. In 1806 Frederick William III (q.v.) was forced into war by Napoleon and defeated at Jena and Auerstadt. He was deprived of all Polish territory except W. P., and of all land W. of the Elbe, but at the end of the wars with France P. was re-established, and her territory extended. By the peace of Vienna P. obtained N. Saxony, Danzig, Thorn, the former Polish prov. of Posen (Poznan), Swedish Pomerania, and Rügen, and most of the Rhineland and Westphalia. The rivalry between P. and Austria became more bitter. William I (q.v.) became king in 1861. Bismarck (q.v.) was made his Prime Minister in 1862. In 1864 P. went to war with Denmark and obtained Schleswig-Holstein; 2 years later she fought and defeated Austria at Sadowa. The free city of Frankfurt, the duchy of Nassau, the electorate of Hesse, and the kingdom of Hanover were subsequently annexed. A N. Ger. confederation, headed by P., was established. In 1870 the Franco-Prussian war broke out, and the hegemony of P. within the Ger. federation was completed at Versailles on 18 Jan 1871, when King William I of P. was elected emperor of the Ger. Empire. Alsace-Lorraine became part of the empire, but was garrisoned largely by Prussians. P. was far stronger than all the rest of the states of the empire combined, and William I further increased the strength of the Prussian Army, and founded a Prussianised Ger. Navy.

The 'Prussian philosophy,' which seems to have originated in Brandenburg rather than in the E. or W. Prussian provs., which always displayed a certain amount of independence, put into action by the Great Elector and followed by his successors—the belief in the complete supremacy of the State and the dominance in that state of the military and civil servant classes, both drawn from the Prussian nobility—was, under the empire, instilled into all Germany. William II (q.v.) succeeded in 1888. With Bismarck's fall from power in 1890 the consolidation of the empire ceased, and a policy for the aggrandisement of P. was adopted which led to a period of disintegration from 1890 to 1918. On 13 Nov. 1918, after the First World War, P. was proclaimed a rep., and William II abdicated. The relations between the Reich and P. were the outstanding problem of the empire, and remained the difficulty of the rep. until the revolution of 1933, the Prussian Gov. being dissatisfied with the amount of autonomy allowed to it by the Federal Gov. The strong social-democrat element in the Prussian Gov. led to an alliance of the *Junkers* with the Nazis, in the hope of regaining their former dominance through a Nazi revolution. But the Nazi victory of 1933 brought the Prussian provs. under the direct control of the Reich, and the prov. governors (*Oberpräsidenten*) were put in a position parallel to that of the governors (*Reichsstatthalter*) in the other *Länder*. P. was, in fact, merged with the Reich, and ceased to possess an individual political personality, though Prussian ideals had a high place in Nazi policy, and Prussians continued to provide the majority of the military leaders of Germany. Prussianism was, however, harnessed to National Socialism; it did not control it. In Feb. 1946 the Allied Control Council sanctioned the dissolution of P., whose constituent provs. were scattered over the 4 occupation zones (Brit., Amer., Fr., and Russian); the parts E. of the rivers Oder and Neisse were given to Poland. P.'s historical dissolution was probably inevitable, since the name had been so closely and exclusively identified with Ger. militarism since the 17th cent., while Poland traced the history of Ger. aggression, through the Teutonic Prussian knights, back into the Middle Ages. See further under BRANDENBURG; EASTERN FRONT OF RUSSO-GERMAN CAMPAIGNS IN SECOND WORLD WAR; EAST PRUSSIA; FREDERICK I; FREDERICK II; FREDERICK WILLIAM, 'GREAT ELECTOR'; GERMANY; WEST PRUSSIA. FEDERAL GERMAN REPUBLIC; GERMAN DEMOCRATIC REPUBLIC; POLAND. See F. Meinecke, *Preussen und Deutschland in 19. und 20. Jahrhunderts*, 1918; L. von Ranke, *Twelve Books of Prussian History*, 1930; W. Dittely, *Zur preussischen Geschichte*, 1936; J. A. R. Marriott and C. G. Robertson, *The Evolution of Prussia* (revised ed.), 1937; E. Stern-Rubarth, *Exit Prussia*, 1940; R. Flenley, *Modern German History*, 1956.

Prussia, East, see EAST PRUSSIA.

Prussia, West, see WEST PRUSSIA.

Prussian Blue, $K_4Fe(CN)_6$, dark blue solid which is precipitated by the addition of potassium ferrocyanide to a solution of a ferric salt. It is insoluble in water and dilute acids, but is acted on by alkalis. Commercially it is prepared by oxidising a mixture of ferrous sulphate and yellow prussiate of potash or potassium ferrocyanide. As a dye it has been superseded by aniline products, but it is still used as a pigment in water-colour painting.

Prussiates, salts of prussic or hydrocyanic acid. Yellow prussiate of potash or potassium ferrocyanide is a lemon-coloured crystalline solid made from potassium carbonate, scrap iron, and nitrogenous waste. It yields a deep blue precipitate (Prussian Blue (q.v.)). Red prussiate of potash, or potassium ferricyanide, is an orange-coloured solid made by passing chlorine through a solution of potassium ferrocyanide, and is used in the making of blue-prints.

Prussic Acid, see HYDROCYANIC ACID.

Prut, left trib. of the Danube. It rises in the Carpathian Mts and flows SE. to join the Danube near Galati, forming the frontier between Rumania and the U.S.S.R. Length 590 m. It was the scene of much fighting in 1944.

Prutenic Tables, astronomical tables, based on the Copernican system, drawn up by Reinhold in the 16th cent., and dedicated to the Duke of Prussia, whence the name 'prutenic.'

Pruth, see PRUT.

Prutho, basic factor in the Israeli system of coinage.

Pruvium, see PROVINCS.

Pryde, James Ferrier (1866-1941), painter, b. Edinburgh. He was an imaginative artist, his appeal being both emotional and decorative. His art verged on fantasy and occasionally exhibits a touch of the genius of Blake. Little recognised, except by other artists, during his lifetime, he came to be regarded after his death as one of the leading romantic painters of the 20th cent. The theatre markedly influenced his style, which also displays a tendency to the macabre. In the sensitive 'Miss Jessie Burnett' and the humorous 'Dr Pryde' he showed himself a master of imaginative portraiture. His finest paintings include 'Romantic Landscape,' 'The Unknown Corner,' and 'The Slum.' These represent the most striking of his variations on the architectural theme. Through such work he strongly influenced such painters as Orpen and Nicholson. As the 'Beggars' staff Brothers' (1894-6) he and Nicholson produced posters (q.v.) that remain classic examples of design. His work, however, varied in quantity: some of it was merely repetitive and had been anticipated by Guardi, Piranesi, and Wm Kent. See life by D. Hudson, 1949.

Prynne, William (1600-69), Puritan antiquarian and pamphleteer, b. Swainswick, educ. at Bath Grammar School, and matriculated from Oriel College, Oxford, in 1618; graduated B.A. in 1621,

admitted student of Lincoln's Inn the same year, and was called to the Bar in 1628. P. is chiefly remembered for his *Histrio-Mastix*, 1632, a work against stage plays; for a supposed reflection in it upon the queen, Henrietta Maria, he was prosecuted, committed to the Tower, fined £5000, expelled from the univ. and from Lincoln's Inn, ordered to stand in the pillory, and to lose both ears (1634). He was at various times fined and imprisoned for his writings, which number at least 200. On the assembly of the Long Parliament he petitioned for redress, and the House declared his sentence illegal, and voted him £4000 by way of reparation. He sat in Parliament for Newport in Cornwall, but he opposed Cromwell's party, regarding the commonwealth and protectorate as illegal, being bitterly opposed to sectarianism and the levelers, and sided with the king. After the Restoration he sat for Bath. He was appointed keeper of the records in the Tower, and on these he did considerable research and pub. some important material. Historians increasingly stress his importance as an antiquarian of some scholarship rather than as a political pamphleteer. See E. W. Kirby, *William Prynne*, 1931.

Pryontelerak, Eskimo name for motor-boat, replacing increasingly the umiak (q.v.) in N. waters.

Prypec, see PRIPET.

Przemysł, tn of Poland, in Rzeszów prov., 40 m. SE. of Rzeszów (q.v.), on the San. It is one of the oldest tns in Poland, and has been the seat of Gk and Rom. Catholic dioceses since medieval times. There are textile and chemical industries. During the First World War P. sustained a siege of 5 months, and did not surrender to the Russians until 22 Mar. 1915. The Germans recaptured P. 6 weeks later. P. fell to the Germans in the invasion of Poland in 1939. It was captured by the Russian marshal, Konev, in his great S. advance, on 28 July 1944. Pop. 48,000.

Psalliota, a genus of fungi, formerly classified under Agaricus, and which now includes the field Mushroom, *P. campestris*, and the horse Mushroom, *P. arvensis*.

Psalmody, in its widest sense, signifies the Psalms of David set to music and sung. Frequently, however, the term is restricted so as to exclude all but the metrical versions of the psalms introduced at the Reformation. Metrical P. was thenceforward in use in all the reformed churches. It died out in England in the mid-19th cent., and long before that the Anglican Church had set the Psalms to non-metrical chants; but in Scotland and in churches of the same tradition it still continues, along with hymns, in the 1650 Scottish version. See J. Julian, *Dictionary of Hymnology*, 1892, and M. Patrick, *Four Centuries of Scottish Psalmody*, 1949.

Psalms, Book of, in modern Heb. Bibles begins the third section of the O.T. canon, that of the writings or hagiographia. In the Septuagint it comes second in this group. The Heb. title is

'Songs of Praise,' the word 'psalms' being taken from the Septuagint. In each version the Psalms are 150 in number, though they are differently divided. The Septuagint has also a 151st Psalm ostensibly Davidic, but frankly recognised as an addition to the original book. In the Hebrew, as in the It.V., the psalter is divided into 5 books, viz. Ps. 1-xii, xiii-lxxii, lxxiii-lxxxix, xc-cvi, and cvii-cl. The close of each of the first 4 books is marked by a doxology. Most of the psalms have titles, some of which ascribe the composition to some author such as David of Asaph, while others denote the occasion of composition and others the manner in which the psalm is to be sung or accompanied. Some of these latter terms, such as *Selah* and *Higgaion*, are very obscure. The psalms are poetic outpourings of devotion to God, deeply spiritual, and showing every aspect of the religious character. Their depth and catholicity have thus made them worthy to hold the position they have ever held in the services not only of the Jewish but also of the Christian Church. They were the prayer book of Christ, and he apparently recited one of them on the cross (Matt. xxvii. 46). As to their authorship, and date, 'In the light of the Ugaritic remains of Canaanite religious literature many of the Psalms must be not later than the tenth cent. There is no longer any reason to refuse a Davidic date for such psalms. At the same time it has become improbable that any of them descend below the fourth century and the assumption that there are Maccabean psalms from the 2nd or early 1st century has become almost incredible.' (W. F. Albright, *Archaeology of Palestine*, 1949). See also *PENITENTIAL PSALMS*. See A. Smith, *The Early Poetry of Israel*, 1910; J. P. Peters, *The Psalms as Liturgies*, 1922; A. C. Welch, *The Psalter in Life, Worship, and History*, 1926; N. H. Snaith, *Studies in the Psalter*, 1934; W. O. Vesterley, *A Fresh Approach to the Psalms*, 1937; B. D. Erdmans, *The Hebrew Book of Psalms*, 1947.

Psaltery, obsolete instrument of the dulcimer type, triangular in shape and with strings stretched across its frame harp-wise, which were played with the



PSALTERY

bare fingers or with a plectrum. It became extinct during the 17th cent. It is usually used in the Bible to translate the Heb. *nebel*, but it may not have existed in biblical times.

Psammetikhos, or **Psammetichus**, see **EGYPT, History**.

Psammitic Rocks (*psammos*, sand), gravelly and sandy rocks. See **SANDSTONE**; **GRAVEL**, etc.

Pseudo-Longinus (1st cent. AD), otherwise unknown Gk author of a treatise *On the Sublime* which was formerly attributed to Cassius Longinus (q.v.). The work, which quotes numerous writers, including *Genesis*, is a masterpiece of literary criticism. The best ed. (with commentary and trans.) is that of W. Rhys Roberts (1907), whose trans. is pub. in *Everyman's Library*.

Pseudomorphism, assumption by a mineral of a form other than that which really belongs to it. Pseudomorphs may generally be recognised by the absence of sharpness in the crystal angles, while the faces usually present a granular, dull, or earthy aspect. Pseudomorphs may be formed in sev. ways, such as: (1) by *infiltration*, when the cavity previously occupied by a crystal is refilled by the deposit of different mineral matter from the infiltration of a solution; (2) by *investment*, or a superficial encrustation of one mineral on the crystal of another; (3) by *replacement*, which is a slow and gradual substitution of particles of new and different mineral matter for the original particles, which are successively removed by water or other solvents; and (4) by *alteration* or the gradual chemical change which crystals sometimes undergo, their composition becoming so altered that they are no longer the same minerals, although they retain their old forms.

Pseudonym, term denoting a fictitious name used by an author who wishes to be anonymous. The secret is usually only a temporary one, but sometimes the anonymity is preserved for a long period. Walter Scott's novels were pub. for years as 'by the author of *Waverley*,' and the identity of Junius, that 18th-cent. writer of vitriolic satire, has never been disclosed. In the days of religious or political persecution the reason for anonymity was obvious, as the author of a work attacking estab. authority might be risking imprisonment or even execution. In more modern times it was common for a writer's earliest work to be pub. anonymously so that if it were a failure he or she would not be personally involved. The first works of Richardson, Fielding, Smollett, Jane Austen, Dickens, the Brownings, and Matthew Arnold were all anonymous. Pen-names are also often used by scholars or professional men who wish to keep their frivolous writings separate from their more important occupations. Hence C. L. Dodgson wrote his children's stories as Lewis Carroll, and Professor Cecil Day Lewis writes detective stories as Nicholas Blake. In many cases the pseudonym has become better known than the real name, and the author is known by it all his life; this was the case with Voltaire (François Aronnet), George Eliot (Marian Evans), Mark Twain (Samuel Langhorne Clemens), and O. Henry (William Sydney Porter). Occasionally a P. is used to cover the collaboration of 2 or more writers, as in

the case of Smectymnus, which is made up of the initials of Stephen Marshall, Edmund Calamy, Thomas Young, Matthew Newcomen, and William Spurstowe, or of Ellery Queen, which appears on the joint work of Frederic Dannay and Manfred B. Lee.

Some famous P.s include *A.*, George W. Russell; *Anstey*, F. T. Anstey Guthrie; *Bell*, Currer, Ellis, and Acton, the Brontë sisters; *Blake*, Nicholas, C. Day Lewis; *Boz*, Charles Dickens; *Bridie*, James, O. H. Mavor; *Carroll*, Lewis, C. L. Dodgson; *Dane*, Clemence, Winifred Ashton; *Douglas*, O., Anna Buchan; *Ella*, Charles Lamb; *Eliot*, George, Marian Evans; *Fougasse*, C. K. Bird; *Henry*, O., W. S. Porter; *Hobbes*, John Oliver, Mrs. Craigie; *Maurois*, André, Emile Herzog; *Molière*, Jean Baptiste Poquelin; *Ouida*, Louise de la Ramée; *Phiz*, H. K. Browne; *Q.*, Sir A. T. Quiller-Couch; *Rita*, Mrs. Desmond Humphreys; *Rutherford*, Mark, W. Hale White; *Sapper*, H. C. McNeile; *Twain*, Mark, Samuel L. Clemens; *Voltaire*, François Marie Arouet; *Ward*, Artemus, Charles F. Browne. See S. Halkett and J. Laing, *Dictionary of Anonymous and Pseudonymous Literature of Great Britain, 1926-34*, and Supplement, 1956; *Writer's and Artists' Year Book* (with list). See also ANONYMOUS.

Pseudopodia, see AMOEBA.

Pellomelane (Gk *psilos*, smooth, and *melas*, black). Hydrated oxide of manganese with or without varying amounts of barium and potassium. There is no crystalline system. Its common form is amorphous, botryoidal, massive, reniform, and stalactitic. It is iron black in colour, passing into dark steel grey. There is a brownish-black streak, and a submetallic and opaque lustre. The hardness is 5-6, and sp. gr. 3.7-4.7. It occurs mainly as sedimentary or residual deposits. P. is a source of manganese used in the manuf. of alloys.

Psilophytales, primitive Devonian vascular plants, with slender erect shoots rising from creeping underground stems. They include *Psilophyton*, *Rhynia*, *Hornea*, and *Asleroxylon*.

Psilorati, see IDA, MOUNT.

Psittacidae, see PARROT.

Psittacosis (Gk *psittacos*, parrot), virus disease of parrots which acquired prominence in 1930, when the infection was transmitted from parrots to human beings in England and other countries. The symptoms resemble those of typhoid, or of a pulmonary disease. The importation of parrots into Great Britain was forbidden for a time as a public-health precaution, but the ban was subsequently lifted. The discovery of the above similarity of the virus of P. to those of Crintheosis and Fowl Pest led to its reimposition by the Minister of Agriculture (acting under the Diseases of Animals Act), not only on parrots but on many other related birds also. This step was taken to protect domestic poultry.

Pskov: 1. Oblast in NW. Russia, SW. of Leningrad, adjacent to L. Peipus

(q.v.). It is lowland partly covered with mixed forests. Area 12,200 sq. m.; pop. (1956) 563,000, mostly Russian. Flax is grown and there is dairy farming. The prin. tns are P. and Pechory. During the 11th-14th cents. it was part of the Novgorod Rep.; it became independent in 1348, and was absorbed by Muscovy in 1510.

2. Cap., economic and cultural centre of the above. It has linen milling, agric. and textile engineering, and food industries. There are many outstanding architectural monuments of the 12th-17th cents. Pop. (1956) 69,000. It was known as an outpost of Novgorod from 903, was cap. of the independent P. Rep. 1348-1510, then a Muscovite fortress, and until the building of St. Petersburg the foremost centre of trade with W. Europe. From 1941 to 1944 it was occupied by the Germans and largely destroyed.

Psoriasis, chronic, relapsing skin eruption, the cause of which is unknown. It has a localised distribution, appearing especially on the elbows and knees, and adjacent parts of the limbs, the scalp and lumbar region, and consists of very scaly patches which often become chronic. P. is not contagious. Because the cause is unknown, treatment is unsatisfactory.

Psychasthenia, form of psychoneurosis (q.v.) characterised by a generalised lowering of nervous tension and therefore of the general level of psychological performance. Janet used the term to describe 1 of the 2 groups (hysteria was the other) into which he subdivided psychoneurosis, and under it he included obsessions, compulsions, fears of all kinds, states of doubt and indecision, and feelings of fatigue. He suggested that in these cases the interference with volitional behaviour by irresolution and doubt, and the compulsion towards meaningless acts, which the patient has great difficulty in controlling despite the fact that he has good insight and recognises his symptoms as being morbid, were due to an inherent failure to achieve apperceptive synthesis. The absence of harmonious integration between the cognitive and the affective-energetic functions would thus explain the lack of interest, the difficulty in sustaining attention, the absence of energy, and therefore the inability to act. Most modern authorities believe, however, that the condition is due to conflict causing a disruptive dissociation and regard Janet's views as being descriptive rather than explanatory. See M. Craig and T. Beaton, *Psychological Medicine*, 1926; R. G. Gordon, D. T. Harris, and J. R. Rees, *An Introduction to Psychological Medicine*, 1936; and D. K. Henderson and E. D. Gillespie, *A Text book on Psychiatry* (7th ed.), 1950. See also MENSTRUATION.

Psyche, youngest of 3 princesses whom Aphrodite, jealous of her beauty, ordered Cupid (Eros) to inspire with love for the vilest of men; but Cupid himself fell in love with her. Unseen and unknown, he visited her each night. Her jealous sisters told her that in the darkness she

was embracing a hideous monster. So P. shone her lamp while he slept, and saw the most beautiful of gods. A drop of hot oil fell on his shoulder; he woke and fled. P. wandered in search of him, found him at last, and entered into an immortal union. The story occurs in Apuleius's *Metamorphoses* (*The Golden Ass*).



Louvre

'PSYCHE,' BY J. PRADIER

Psychiatry, branch of medicine, which deals with mental ill health, however produced. The way in which mental illness is treated reflects the theories which are held about it; for instance, the belief that mental illness was due to demonic possession led to its treatment by some method of exorcism. Modern concepts emphasise the interdependence of body and mind, and particularly the close connection between the activity of the brain and that of the mind. Modern treatment employs physical methods to alter the activity of the nervous system and, through that, of the mind, and psychological methods which deal with the mind directly. Some forms of mental illness respond better to one, some to the other, while many patients do best with a combined approach.

The classification of mental illness presents considerable difficulties. It may be classified according to the alleged cause, the obvious symptoms, or the physical disease of the brain with which it is associated. A convenient classification is as follows: (1) conditions of incomplete

development—idiotcy, imbecility, and feeble-mindedness, either primary, due to some defect of the germ-plasm, or secondary, due to environmental causes operating before, during, or after birth, with arrest of the development of the brain and mind; (2) conditions of mental disorder—the psychoneuroses (see *PSYCHONEUROSIS*) and psychoses (see *PSYCHOSIS*); (3) conditions of mental decay—the various types of dementia.

The dividing lines between these groups are by no means definite, e.g. the feeble-minded may be psychoneurotic or psychotic, and in the group of organic psychoses, including general paralysis of the insane, the psychoses due to alcohol, etc., dementia may be a prominent feature.

Treatment of Mental Illness. Where physical factors are of major importance in the causation, treatment is largely that of the underlying physical cause, e.g. the treatment of general paralysis of the insane with malaria and penicillin, the treatment of psychoses, occurring in myxoedema (a disease of thyroid deficiency) with extract of the thyroid gland. Physical methods of treatment are described under *psychosis* (q.v.). Drugs are used mainly to decrease anxiety and restlessness and to procure sleep. Certain drugs, such as amphetamine sulphate, are used as stimulants, e.g. in depressive illnesses. Many patients, particularly those with mild anxiety states, respond well to rest in bed. In severe restlessness and excitement, e.g. mania, continuous baths at body temp. are useful. Many patients refuse food and it is necessary to ensure that they get sufficient.

Psychological Treatment and Psychotherapy. The object is: (1) to modify the environmental factors in order to provide satisfactory environmental conditions when possible; (2) to produce such a change in the patient that he can re-adapt himself to his environment with, when possible, an increased understanding of himself and his illness.

(1) Admission to hospital is, of course, a major alteration of environment, and can be handled so as to prove of great benefit. It may be necessary to remove a patient from an environment, often the home, which is not suitable. Occupational therapy, the organised provision of an occupation suitable to the patient, is of the highest value in the treatment of both hospital and out-patients. Trained psychiatric social workers are invaluable in, for example, making contact with a patient's home and employers, in adjusting home and working conditions where necessary, and in helping patients to find suitable clubs and other social activities.

(2) Minor psychotherapy uses simple explanation and discussion of problems, and of the nature and origin of the illness, and is often combined with reassurance. Suggestion may be given indirectly by the whole atmosphere of consulting-room and hospital, by the physician's personality, and sometimes in the use of inert medicines; or directly with the patient, either

fully conscious or hypnotised. Suggestion is particularly effective in the hypnotic state (see HYPNOTISM). Major psychotherapy includes those analytical methods which aim at a complete understanding of the patient by himself. It is indicated for some of the more complex and severe psychoneurotic illnesses and has been used occasionally in some psychoses. Treatment is very prolonged. There are sev. schools of major psychotherapy, the best known being the psychoanalysis of Freud (q.v.), the analytical psychology of Jung (q.v.), and the individual psychology of Adler (q.v.).

Many mental illnesses can be traced to emotional conflicts having their origin in early childhood, and the work of child-guidance clinics is of great prophylactic importance. In these clinics, the number of which is steadily increasing, the work is carried out by a psychiatrist, a psychologist, and a social worker as a team. Together they arrive at an estimate of the handicaps and possibilities of the child, and are able to give advice and treatment accordingly. Some recent study has been made of the physiological conditions which cause the hallucinations that are such a distressing feature of many mental disorders. It is known that the drugs mescaline and lysergic acid diethylamide are hallucinogenic, and Rodwight and Mollwain, of the Institute of Psychiatry, have been investigating their biochemical reactions. Much remains to be discovered, and it is too soon to state that a drug cure for some mental diseases, such as schizophrenia, will be found. But at least it may be said that the alleviation of psychiatric symptoms may soon be achieved. See J. D. Campbell, *Everyday Psychiatry* (2nd ed.), 1949; D. K. Henderson and R. D. Gillespie, *A Text-book of Psychiatry* (7th ed.), 1950; A. E. Tredgold, *A Text-book of Mental Deficiency* (8th ed.), 1952; D. Curran and M. Partridge, *Psychological Medicine* (4th ed.), 1955.

Psychical Research, or Parapsychology, scientific study of the facts and causes of mediumistic and other alleged supernormal phenomena beyond consciousness. Such phenomena as yet unexplained by known laws include telepathy, clairvoyance, psycho-kinesis (movement of objects without contact), precognition, divining, 'faith healing', and hauntings. It is clear that these investigations are important, since, if the phenomena are satisfactorily estab., our ideas of life, personality, and mind (perhaps even of space, matter, and time) are inadequate, and must be modified to include the new facts. For the evidence for telepathy see separate article. The evidence for rhabdomancy or 'dowsing', the divination of water and various minerals by means of a twig, suggests that the explanation is not physical, but that the dowser possesses the faculty of clairvoyance. P. R. has also been applied to spiritualistic phenomena, such as spirit messages, automatic writing, and materialisation (see under SPIRITUALISM), and to the investigation of

haunted houses, poltergeist disturbances, and similar phenomena.

Organised P. R. originated with the foundation of the Society for P. R. in 1882; past presidents include Wm James, Sir Wm Crookes, Sir W. Barrett, Henri Bergson, Sir Oliver Lodge, C. D. Broad, Lord Rayleigh, and H. H. Price. The society includes among its members many men and women of great eminence in the world of science and letters. Other societies with similar aims include the Amer. Society for P. R. and the Institut Métapsychique International in Paris. Professor J. B. Rhine started in 1927 a parapsychological laboratory at Duke University, North Carolina, which has since been an active centre of research. The Perrott Studentship in P. R. has been estab. at Trinity College, Cambridge, and the Blennerhassett Trust with the same object at New College, Oxford. There is also the Hodgson Fellowship in P. R. at Harvard Univ., and an International Congress of P. R. meets occasionally in various parts of the world. See also under **PSYCHOLOGY**. See W. J. Crawford, *Reality of Psychic Phenomena* (2nd ed.), 1919; F. A. Schrenck-Notzing, *Phenomena of Materialisation*, 1920; Sir W. Barrett and T. Besterman, *The Divining Rod*, 1926; T. Besterman, *Some Modern Mediums*, 1937; G. N. M. Tyrrell, *Science and Psychical Phenomena*, 1938; S. G. Soal and F. Bateman, *Modern Experiments in Telepathy*, 1954; S. Sitwell, *Poltergeists*, 1940; W. Carrington, *Telepathy*, 1945; J. B. Rhine, *New World of the Mind*, 1953; also the *Proceedings and Journal of the Society for P. R.*

Psychoanalysis, name given to the special technique discovered by Sigmund Freud (q.v.) for the exploration of the mind in search of those repressed thoughts and ideas of which the subject is unconscious. According to the psychoanalysts, many forms of mental disorder are to be regarded as the consequence of conflict between repressed or unconscious ideas and conscious thoughts; the abnormal conduct which accompanies the disorder being the expression in action of these unconscious ideas. Freud's doctrines have developed, in particular, from his studies of dreaming. Dreams, he claims, are dramatisations of unconscious wishes, made possible through the relaxation in sleep of the control exercised by the conscious system of ideas and thoughts. In waking life the conscious system is able to repress any expression of the unconscious system in thought, and even in sleep it exercises the role of a 'censor,' restricting expression to forms which appear meaningless when recalled and scrutinised. Most people dream, but most people are not mentally disordered. The distinction between the normal and the psychoneurotic individual is, therefore, not that the latter alone has an unconscious region of his mind but that it is in some way disturbing his behaviour in such a way as to reduce his happiness and his social effectiveness. The object of the psychoanalytic therapy is to restore him to

happiness and social usefulness by making him aware of the unconscious forces which are disordering his conduct and so enabling him to bring them under voluntary control. This insight into the previously unknown causes of his illness is gradually gained during a series of sittings with his analyst lasting generally many months. The length and cost of the analytic method of cure very severely limits its general usefulness, and more rapid methods of treatment are often employed, although Freud himself condemned the attempt to accelerate the process of P. Since Freud's time there has, however, been a considerable development of group analysis which offers both the advantage of dealing with many people at the same time and also that of giving treatment in a social situation less artificial than that of the analyst-patient dialogue. The same advantages are given by the method of psychodrama which Dr Moreno has developed as a free drama carried out with the aim of mental cure.

The causes of psychoneurotic disorders are very generally found to lie in early emotional relationships with the parents. The typical form of this relationship (called the Oedipus complex in the case of male patients and the Electra complex in the case of females) is a strong emotional attachment to the parent of the opposite sex and jealousy and hatred of the parent of the same sex. Both the love and the hate are normally unconscious and the conscious attitudes may be very different. The unwillingness of the patient to recognise this source of his troubles is attributed by Freud to repression, the active banishment of the system of feeling from the conscious mind into the region of the unconscious. The cure depends on the removal of this repression and the consequent emergence of the repressed system into the conscious mind, where it can be dealt with in a rational manner.

The use of the term repression in translation of Freud's works has led to a widespread misunderstanding in which he is supposed to be using the term not in the severely technical sense of psychoanalytic theory but in the more popular sense of forbidding people to do what they want. Thus it is thought that Freud taught that men would all be mentally healthy if they were allowed to do what they liked, and that, in particular, children should not be prohibited from doing what they want to do. This was far from his thought. Freud considered that the prohibition of primitive impulses was a necessary condition for the development of civilisation. Nor does P. give any support to the curious idea that mothers should refrain from kissing their sons lest they should develop an Oedipus complex. Freud thought, on the contrary, that the love relationship between parent and child was a necessary part of the healthy emotional development of the child. It was the concomitant development of hatred and the banishment of the whole system into the unconscious that he regarded as harmful.

The psychoanalytic method has been found valuable in the treatment of some forms of neurosis, although others are resistant to it. As a method of treatment of the psychoses or insanities it has not been found generally successful, although it is undoubtedly helpful in providing a theory of their causation. The understanding of the causation of disorders of behaviour provided by P. has been found of great value in the treatment of delinquents by Alchorn and others, even when the use of the full psychoanalytical technique is not possible.

P. is not, however, merely a system of therapy. Its acceptance leads to concepts of the mind and of mental processes which in turn result in new views of many forms of human activity. Thus psychoanalysts have investigated problems of the social conduct of men—customs (dress, totem and taboo, religious ritual, political action, etc.); of art; of education; of literature and primitive story-telling. In every one of these fields it has shed much light. At first the new views provoked a great deal of opposition, but they are now receiving the general approval of orthodox psychological and medical authorities. See the works of Freud, in general, especially *An Autobiographical Study*, 1935, *An Outline of Psychoanalysis*, 1949, and *Three Essays on the Theory of Sexuality*, 1949; G. Itoheim, *Psychoanalysis and the Social Sciences*; A. Alchorn, *Wayward Youth*, 1936; F. Glover and M. Brierley, *An Investigation into the Technique of Psychoanalysis*, 1940; G. Richard, *La Psychologie et les problèmes psychiques et moraux*, 1946; K. Jones, A. Brill, etc., *Psychoanalysis To-day*, 1946; and A. Freud, *The Psychoanalytic Treatment of Children*, 1947.

See also PSYCHIATRY; PSYCHONEUROSIS; PSYCHOPATHOLOGY.

Psychology may be broadly defined as the science of mind. The word is derived from the Greek, and means the science of the soul. In ancient and medieval times P. was regarded as a branch of philosophy dealing with the principle of life, sensation, intelligence, and conation, especially in human beings. It was essentially speculative and static, in contrast to the modern practical and dynamic study of P. The chief psychological theses of the scholastics included the unity and unifying power of the soul, its essential connection with the body, its spirituality and immortality, the freedom of the will, and the dependence of the intellect upon sense data. Modern P. is, however, regarded as a branch of experimental biology. It may be defined as the science of mind or, more specifically, as the positive science of human behaviour and thought. Its predominantly experimental character has led to a decline of interest in such purely speculative questions as that of the relation of mind to body. It is known that mental processes are related to changes in the nervous system, but the experimental psychologist is inclined to be little interested in whether this relation is one of parallelism or of mutual interaction. The tendency of

physiological P. has generally been to favour the former view or to regard both psychical and physiological events as different aspects of the same series of events. On the other hand, there are still exponents of the interactionist view that psychical events act on the nervous system and are acted on by events in the nervous system. Generally the experimental psychologist is impatient of such problems which affect little if at all his actual observations, and he is inclined to suspect that the existence of such questions is merely due to the inadequacy of language to express relationships of an order so remote from the problems of practical life with which language was designed to deal.

The idea of applying the method of scientific experiment to the problems of the mind arose about the middle of the 19th cent. with measurements of the least difference of a light or other stimulus which could be just perceived as a difference in sensation. Soon afterwards the psychologists were studying the sensations of colour and sound, while Ebbinghaus was making studies of the rate of forgetting of nonsense syllables. In 1879 the first psychological laboratory was founded at Leipzig Univ. These earlier researches were dominated by the atomistic ideas of the pre-scientific associationist P. The method for P. was regarded as that of finding the simple elements out of which the complex processes of the mind were made up. Thus thought was regarded as a chain of simple ideas linked together by bonds of association, and perceptions were regarded as compounds made up of elementary sensations. The cramping effects of this system of ideas were overcome by the Gestalt psychologists (Wertheimer, Köhler, and Koffka) at about the time of the First World War, and experimental P. was enriched with a large number of researches in which for the first time the complex processes of thought and perception were studied as realities in their own right and not as mere aggregations of simpler elements.

A problem which early attracted attention in P. was that of the nature of learning. Thorndike conducted experiments on animals learning to get out of puzzle boxes and concluded that their learning was due to the mechanical operation of the Law of Effect, that the cat tries all sorts of behaviour at random, and that any bit of behaviour that happens to succeed is more likely to occur next time, while those bits of behaviour followed by failure are less likely to recur. Later researches (such as those of Köhler on chimpanzees learning) make it clear that insight or understanding of the situation is an essential part of learning, and it is now clear that even the learning of a cat is not so blind and mechanical a process as Thorndike had supposed. In considering the application of P. to education it is particularly important to avoid the view of learning as a mechanical stamping in of right responses and to consider it rather as a matter of progressive understanding.

One part of work in P. followed the tradition of the Ger. laboratories and was concerned primarily with the estab. of general laws of human P. A totally opposed tradition was started in England by Sir Francis Galton in which the centre of interest was the difference between individuals. The study of individual P. was particularly taken up by the Amer. psychologists. Its most important advance came, however, from the work of Binet in France, who made the first practical series of intelligence tests as a means of measuring the relative general intellectual capacities of different individuals. Binet's scale of intelligence tests was much improved by Terman in America and is now used for the clinical measurement of intelligence differences, particularly for the detection of mental defect (*see* MENTAL TESTS). Other forms of intelligence test are used for distinguishing the children with sufficient intellectual capacity to profit by a grammar school education. Another important advance in P. came not from the psychological laboratories but from the doctor's consulting room. Early in the present century Freud (q.v.) brought forward a revolutionary theory of the nature of the unconscious mind, generally called the theory of psychoanalysis (q.v.). The motive power of the sex life is defined as the *libido*, although Freud used this term to denote psychic energy in general. This theory opened new vistas of the determination of human behaviour which have had important influence both on psychological theory and practice. Important modifications of psychoanalytic theory as well as changes in the technique of treatment have been made by Jung, Adler, Reik, and others. *See also* PSYCHO-NEUROSIS.

An important branch of P. of relatively recent development is that of social P. Early experiments in P. treated the individual as an isolated unit, ignoring the influence of the social setting. In some experiments, such as those on suggestion, the influence of the social situation became obviously of paramount importance. Social P. may be defined as the scientific and experimental study of the individual in his relationship with other individuals and with social groups. Such problems as anti-semitism, class conflict, re-education of delinquents, conditions of harmonious relationship within industry, military discipline, etc., all obviously belong to this branch of P. So, to a large extent, do the problems of character and of school education. Lewin has devoted himself to the task of developing concepts adequate to the problems of social P. In this development P. is obviously related to the sciences of sociology and anthropology, as the earlier experimental P. was related to physiology.

The development of the theory of intelligence testing required new mathematical techniques. The discovery of statistical methods originally by Galton and developed by Pearson and Fisher has made possible the adequate treatment of

quantitative results in P. which would otherwise have been impossible. From the relatively simple use of correlation coefficients by early workers on testing has developed the use of matrix algebra in factor analysis which puts this branch of psychological study beyond the grasp of those without special mathematical knowledge. This is one example of the fact that modern P. is inclined to be a somewhat difficult branch of study. Psychologists are often blamed for adopting a technical jargon which obscures their meaning from a lay reader. This, however, is a necessity arising from the fact that the science of P. is dealing with concepts which have generally no place in ordinary everyday thought, and that therefore there are no generally understood words for them. Scientific P. is in no different case from any other science; the uninstructed reader would find it difficult to read a modern text-book on physics or chem. In order to understand any science a student must learn its technical language. Even the student of P. may, however, be exasperated at discovering that he must learn many technical vocabularies—that of psychoanalytic theory, for example—as well as that of learning experiments and mental testing. It must be remembered, however, that P. is a young science, and complete agreement in technical vocabulary is unlikely so long as new ranges of fact are being assimilated. It is to be hoped that this will be only a transitory situation.

The success of the intelligence tests led psychologists to hope that equal success would be obtained in testing qualities of character (or personality). This proved to be a much more difficult task. It is not obvious along what particular lines character should be tested in order to give the maximum amount of information. If one measured all traits of character distinguished by different names, the number would be prohibitively large. There is now general agreement, with minor differences, as to the main character traits which it is convenient to measure. Some of these can be measured by suitably devised tests; some can be assessed only by those who have had the opportunity of seeing the everyday behaviour of the individual in question. The main importance of character testing is in clinical P. where disorders of personality are diagnosed. For this purpose, the most satisfactory kind of tests are found to be those of the 'projection' type in which the person tested is asked to construct a story, make a drawing, or to report the pictures he can see in a formless ink-blot. The mental productions he makes under these conditions can be interpreted by a skilled tester as revealing his peculiarities of personality and his personal problems. Such tests are not easy to apply and need special training and powers of intuitive judgment in the person using them.

The practical applications of P. are now manifold. It is important in education both as providing means of assessing the

abilities of children and also of giving guidance as to methods of learning and teaching. Teachers now commonly include a course of educational P. in their training course. Starting from the work of Taylor and Galbraith, there has been increasing application of psychological principles and methods of selection to the problems of industry. The application of industrial P. is, in this country, largely carried out by the National Institute of Industrial P. A closely related practical problem occurs in time of war when much of the energy of psychologists of all countries is devoted to devising and carrying out methods of selection amongst the large number of recruits, of improving methods of drill, and of selecting the most suitable officers. Psychological clinics in most educational areas use psychological methods in the treatment of problem children, both as a means of reducing the educational difficulties of such children and also in the hope that early treatment of mental peculiarities may prevent the development of serious mental disorder later. Methods of treating delinquent children have been developed by Homer Lane, Aichorn, and others. These are also influencing the approved schools and other institutions to which convicted children are sent, and it is hoped that early psychological treatment of such children, with an emphasis on re-education rather than punishment, will prevent their developing into habitual criminals. The Institute for the Scientific Treatment of Delinquency also applies psychological treatment to adult offenders.

New and as yet unsolved problems in P. are raised by the experiments of psychical research (q.v.) (now commonly called parapsychology). The reality of communication between minds without sensory contact (telepathy) was demonstrated as early as 1884 in the early days of the Society for Psychical Research, but they attracted little scientific attention till they were reinvestigated in the parapsychological laboratory of Duke Univ., N. Carolina, under the leadership of J. B. Rhine. It is now clear that parapsychological phenomena are not (as was at one time supposed) limited to telepathy but that there can also be paranormal knowledge of future events and of events not known to any other mind. There has been considerable reluctance to accept these findings amongst psychologists and other scientific workers because they do not fit the system of expectations raised by the naturalistic philosophy which is the generally accepted point of view of the scientific world. On the other hand, it is reasonable to consider them as an important challenge to current psychological theory. Where in any science the unexpected is proved to happen, there is a possible point of advance in theory. The soul as an entity, which seemed to have disappeared from the theory of scientific P., may be found to be required as a necessary hypothesis for the explanation of the acts of parapsychology.

See also CHILD STUDY; EMOTIONS; FEELING; MEMORY; MIND; SUBJECT AND SUBJECTIVE; WILL.

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Psychoneurosis term applied to conditions characterised by various mental and physical signs and symptoms, for which no physical cause can be demonstrated. It constitutes reactive evidence of a failure in adaptation within the personality. Whereas superficial examination may suggest that the cause lies in the individual's failure to achieve harmonious adjustment to his environment, funda-

mentally the real trouble is always within the ego itself. An example of this is provided by the case of the soldier who 'breaks down' in war. Here the true breaking stress is not due to the conditions in battle (whose role is merely precipitant) but to his failure satisfactorily to solve the conflict between his instinct of self-preservation and the demands made upon him by his ideals of duty, loyalty, and self-respect. Thus the existence of psychoneurotic symptoms always implies the presence of mental conflict, and psychotherapy aims at removing them by discovering and solving the latter. Such a conflict, whatever its nature, induces a marked state of deep insecurity, which manifests itself emotionally in the form of anxiety. The symptoms in P. may be either physical or mental, and the former can be sensory, motor, or visceral. The sensory or purely subjective disturbances may occur in any or all of the systems of the body and may take the form of anaesthesia, hyperaesthesia, and paraesthesia. Such symptoms, which were regarded at one time as 'imaginary,' are none the less real because they are hysterical. Motor manifestations include paralysis, paresis, tics, tremors, and anomalies of gait and speech. Visceral symptoms include tachycardia, vomiting, diarrhoea, polyuria, etc. Reactions in the mental field include: (1) phobias of all kinds, e.g. of heights, enclosed spaces, disease, etc.; (2) amnesia (q.v.); (3) trance (q.v.) states and somnambulism (q.v.); and (4) obsessions (see OBSESSIONAL PSYCHONEUROSIS). Clinically P. may be sub-divided into: (1) neurasthenia (q.v.); (2) anxiety states (q.v.), including 'anxiety neurosis' and 'anxiety hysteria'; (3) hysteria (q.v.); and (4) obsessive compulsive P. There would appear to be good grounds for believing that psychoneurotic illness is more prevalent than was at one time suspected. It has been stated that at least one-sixth of the hospital out-patients attending the departments of general medicine, one-third of those receiving benefit under the National Health Insurance Scheme for a month or more, and an even higher proportion of patients seen in general practice, are not suffering from any physical disease but from some form of P. Some authorities, however, claim that the figures are much higher than these. It is indisputable that the loss of time and efficiency due to psychoneurotic reactions must constitute a serious adverse factor in the national economy. See also ANXIETY STATES; HYSTERIA; NEURASTHENIA; OBSESSIONAL PSYCHONEUROSIS; PSYCHOPATHOLOGY; SHELL-SHOCK. See R. G. Gordon, D. T. Harris, and J. R. Rees, *An Introduction to Psychological Medicine*, 1936; E. Miller, *The Neuroses in War*, 1940; D. K. Henderson and F. D. Gillespie, *A Text-book of Psychiatry* (7th ed.), 1950; and F. Dunbar, *Psychosomatic Diagnosis*, 1945.

Psychopathology. The simplest classification of mental illness is into the psychoses (q.v.) and the psychoneuroses

(q.v.) and, while transitions between these groups may and do take place, they are nevertheless exceptional occurrences (*see also* PSYCHIATRY). Considered from the biological angle there are sev. points on which they may be distinguished. In a psychosis a complete or total change in the personality of the patient takes place and his appreciation of reality is qualitatively altered, with the result that his behaviour is correspondingly affected. In psychoneurosis, on the other hand, there is no outward evidence of a personality change, for there is only a part reaction. The appreciation of reality may be diminished (i.e. quantitatively altered) but it remains qualitatively unaffected. In consequence, unlike the psychotic, there is nothing in the behaviour of the psychoneurotic to indicate that the meaning which reality has for him differs in any way from the meaning which it holds for the normal individual. In psychosis the change in reality values may be partly expressed as a projection (i.e. purely subjective experiences may be ascribed to external personal agencies), but projection of this kind does not occur in the psychoneuroses. Neither is speech, as such, disturbed in the latter, but in the psychoses distortion may occur, for here the content of the unconscious finds direct verbal expression. In the psychoses, too, there is frequently a regression to an infantile level of activity, which is not found in the psychoneuroses, except in the absence of clear consciousness. As regards their aetiology, while there is no evidence of direct biological transmission of mental disorders, heredity is believed to play a more important role as a predisposing factor in the psychoses. In the psychoneuroses early environmental influences are regarded as the main determinant, although a neurotic heredity is also frequently present. The psychoses may be broadly divided into organic and non-organic groups, according to the presence or absence of a discoverable physical cause, e.g. in *Amentia* (mental deficiency) there is a failure in development of the cortical cells; in *Dementia* they undergo degenerative changes; while in the toxic psychoses these cells and their connections are poisoned by endogenous or exogenous toxins or infections. In the schizophrenic, paranoiac, paranoid, and effective reaction groups, while the exact aetiology is still obscure, a combination of some psychological factor with an hereditary disposition is suggested as the cause. To appreciate the importance of the part which early environmental influences can play in the development of psychoneurosis it must be borne in mind that mental development occurs gradually and progressively as a reactive response to the demands of adaptation, and that the latter fundamentally involves conflict between the instincts and the environment. The instincts are in-born forces and form part of the innate equipment of man and animals. There are probably only 2, self-preservation and sex (some include a herd instinct), and the

patterns for their expression are either hereditary or acquired, but some of the former may not mature until after birth. The acquired patterns, in response to the demands of environment, increase both in number and complexity as age increases. Instinctual satisfaction is accompanied by a feeling of pleasure, and in early life it is this so-called pleasure principle which governs all the activities. Later the demands of reality bring about the substitution of the reality principle, which makes possible the abandonment or postponement of the pleasurable attainment. This substitution constitutes the dividing line between the primary phase when all associations are entirely subjective (i.e. undifferentiated consciousness) and the beginning of the development of object consciousness. The first and most important objects differentiated by the child are its parents, but since already an exclusive association has been estab. with its mother, this entails the recognition of a rival. Here, then, is its first impact with an environmental obstacle, the peculiarly intimate nature of which creates the ambivalent situation in which love and hate co-exist and contend for supremacy. The partly conscious formulation of an ideal to be like them results from the child's early identification with its parents: it is this fact which renders even their unconscious example such a potent factor in the formation of its habits. This parental training, at first by example only and later by precept as well, is subsequently continued by its teachers and companions, and it is during this training phase that the foundations of its future specific reaction trends as well as its general emotional attitudes are laid down. As its contacts outside the home circle increase, they provide the necessary stimulus for its adaption to the requirements of society, but success or failure adequately to achieve this can already have been largely preconditioned by the nature of the environmental influences in the home. Meanwhile the personality, which has been described as the synthesis of innate endowments, environmental influences, and the reactive trends resulting from conflicts between these 2, is being slowly formed and on the soundness of this synthesis will depend its future stability. Failure harmoniously to integrate these formative factors will later provide the intrapsychic tension underlying some form of psychoneurotic reaction, for psychoneurosis is essentially evidence of failure of adaptation or conflict within the ego itself, which induces a severe sense of insecurity with its attendant emotional state of anxiety. This emotional tension, if sufficiently severe, sets up excessive autonomic and endocrine activity, producing symptoms due to disturbances of circulation, digestion, respiration, etc. Displacement of the affect from the original conflict is thus facilitated and a conversion hysteria may result. Or alternatively, with the failure of the mechanism of repression, the brunt of the conflict may fall in the psychic field, and

manifest itself as an intense emotional preoccupation ending possibly in an hysterical amnesia or a fugue. If, however, the partial failure of repression is followed by the substitution for the repressed material of some apparently irrelevant idea or aimless act, to which the affect is displaced, an obsessive compulsive state will result. The personality make-up (and certain other factors) would appear to have some influence in determining the particular type of psychoneurotic reaction that occurs. Thus the hysterical reaction would appear to occur chiefly in the uncritical non-introspective type. On the other hand, the obsessive compulsive types of reaction are found mainly in the over-consciousness, ultra-critical, introspective and more highly intelligent groups. See R. G. Gordon, D. T. Harris, and J. R. Rees, *An Introduction to Psychological Medicine*, 1936; E. Miller, *The Neuroses in War*, 1940; F. Dunbar, *Psychosomatic Diagnosis*, 1945; and D. K. Henderson and R. D. Gillespie, *A Text-book of Psychiatry* (7th ed), 1950.

Psychophysics, that branch of experimental psychology (see **PSYCHOLOGY**) which deals with the correlation of mental with physical changes, when physiological conditions are kept constant.

Psychophysiology, that branch of experimental psychology (see **PSYCHOLOGY**) which deals with the correlation of mental events with physiological changes.

Psychosis. The name given to certain serious mental disorders, most of which satisfy the legal criteria of insanity (q.v.) in that the patient cannot take care of himself or is a danger to others, or both; in addition psychotic persons show 1 or more of the following mental abnormalities; (1) loss of touch with or distortion of accepted interpretations of reality, shown, for example, in hallucinations, delusions, or disorders of thought; (2) severe and lasting emotional disorders, e.g. the abnormal elation of spirits in mania, the profound depression of the depressive psychoses, the lack of correspondence between ideas and feeling, and the lack of depth of feeling in schizophrenia; (3) a retreat from normal social relationships to a state of excessive dependence or hostility; (4) a return to infantile habits such as open masturbation, soiling with excreta, etc.; (5) disintegration of the personality so that infantile impulses are given direct or but thinly veiled expression; (6) acute disorders of intellectual function, as in delirious states, or permanent intellectual deterioration in the dementias.

There is never a single cause for the mental state of a person. Thus overwork, so frequently blamed for nervous breakdown, is never a sufficient explanation for P. or psychoneurosis (q.v.). There are 3 groups of factors, constitutional, psychological, and physical, which have to be considered in every case. In certain types of psychotic and psychoneurotic reaction, especially the manic-depressive psychoses and schizophrenias, the constitutional (i.e. hereditary) factors are

particularly important, but it may require the operation of psychological factors (e.g. emotional upset) or physical factors (e.g. organic illness of any kind) before a predisposed person becomes manifestly psychotic or psychoneurotic. In other cases (e.g. deliria in acute infections) the physical factor is clearly the major one. The main types of psychotic reaction are described under insanity (q.v.).

Treatment of psychoses is usually carried out in hospital, but by no means all psychotic persons are in hospital, many being able to carry on a fairly normal life despite some psychotic symptoms. Treatment includes care and control and general medical attention. Suitable occupations are provided. Close supervision may be needed to prevent suicide. Of more specific treatment mention must be made of certain fairly recent advances which have revolutionised psychiatric practice: (1) the treatment of general paralysis of the insane, a dementing P. due to syphilitic infection of the nervous system, by means of infection with malaria, or artificially produced hyperpyrexia, and penicillin; (2) the treatment of schizophrenia by insulin injections almost daily, over a period of weeks or months, to produce hypoglycaemic comas; (3) the treatment of depressive states by electrically induced convulsions; (4) the treatment of certain severe and uncontrollable psychotics by pre-frontal leucotomy (q.v.), an operation on the brain; this operation is also of value in some severe psychoneurotic illnesses; (5) the use of drugs to produce prolonged sleep in the treatment of tension states and mania. The outlook in some of the illnesses so treated has completely altered, many patients recovering or improving for whom there would otherwise be little hope. See also under **PSYCHIATRY**; **PSYCHOLOGY**; **PSYCHONEUROSIS**; **PSYCHOPATHOLOGY**. See D. K. Henderson and R. D. Gillespie, *A Text-book of Psychiatry* (7th ed.), 1950.

Psychotherapy, see **PSYCHIATRY**.

Psychrometer, alternative name for wet- and dry-bulb hygrometer (q.v.).

Ptah, god of Memphis in ancient Egypt, always represented as a primitive human statue or mummy: rose to importance when Memphis became the cap. on union of Egypt under the 1st Dynasty. He assimilated a neighbouring funerary god Sokar, and came to form a triad with the lion-goddess Sekhmet and Nefertem. In a reconciliation of the Memphite and Heliopolitan theologies 8 gods of creation were declared to be limbs of P., the supreme creator.

Ptarmigan (*Lagopus mutus*), smallest Brit. grouse, frequenting the highest mts in its more S. range, and extending throughout the Arctic and sub-Arctic regions of the N. hemisphere. It formerly occurred in Cumberland and Wales, but in Britain is now confined to N. Scotland. It is an excellent instance of protective colouring, assimilating itself perfectly to its surroundings, the plumage becoming as it changes white, grey, red,

or brown, except for the wings, underparts, and legs, which are always white. It hatches its young in June in a mere depression among moss and stones. The males are monogamous. Poulterers import P. from Norway, where they are snared.

Pteraspids, jawless ostracoderms of the order Heterostraci, abundant in Lower Devonian times. The front of the body was protected by armoured plates, and the remainder covered by scales. There was no dorsal nostril as in other ostracoderms.

Pteris, see BOGHAY KEUL.

Pteridophyta (Gk *pteros*, a fern (from *pteron*, a wing, with reference to the feathery fronds), and *phuton*, a plant), one of the 4 great groups, or phyla, of the plant kingdom which comprises the ferns and their allies: horse tails, club-'mosses,' and many extinct plants, some of which were of large size and became transformed into coal deposits. The P. are also known as vascular cryptogams, since there is no obvious sexual process in their mode of reproduction: microscopic spores are formed, and these develop into small independent bodies called prothalli, which reproduce sexually and give rise to a new generation of adult plants, so that there is an *alteration of generations*. See articles on the individual plants, etc.

Pteridosperms, or 'seed-ferns,' group of fossil plants having fern-like foliage but possessing seeds. Their leaves are common fossils in the Coal Measures. *Lyginopteris*, *Neuropteris*, and *Alethopteris* are typical genera.

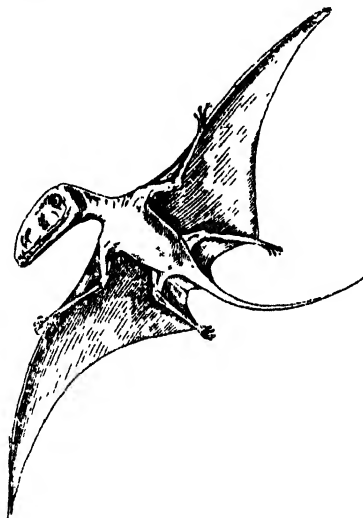
Pterins, name proposed for the pigments from the colouring matter of butterflies' wings. They are purine (q.v.) derivatives. Xanthopterin is the yellow pigment of the lemon butterfly and leucopterin that of the white one.

Pteris, now *Pteridium*, see BRACKEN.

Pterodactyls, extinct Mesozoic flying reptiles of the order Pterosauria, whose limbs were highly adapted for flight. The bones were hollow and air-filled, while the fourth finger of the fore-limb was enormously elongated to support a flying membrane which ran back along the body and thigh. They were probably fish-eaters. Early forms such as *Rhamphorhynchus* still had a long reptilian tail and numerous teeth. *Pterodactylus*, from the Jurassic, was about the size of a sparrow, with a very short tail, and teeth only in the front part of the mouth. *Pteranodon*, from the Cretaceous, was much larger, with a wing-span of about 25 ft., a long crest extending back from the skull, and a long toothless beak.

Pteropods, or Sea Butterflies, group of Opisthobranch molluscs, comprising about a hundred species, which are organised for swimming freely in the ocean, having a pair of fins developed from the sides of the mouth and neck, enabling the animal to progress by flapping. There are 2 families in the group. The Thecosomata are provided in the adult form with small glassy shells; though the young of all P. are protected by a shell, the species be-

longing to the second order, Gymnosomata, are naked when adult. In some parts of the ocean they exist in immense numbers, discolouring the water over vast tracts, and in high lat. they, especially *Clione borealis*, constitute the prin. food of the baleen or whalebone whales, which strain them from the water with the whalebone sieve. The iridescent fretted shell of *Clione cuspidata* is the best-known shell of the Thecosomata. The shells of some form a considerable sediment at great depth.



Masson et Cie, Paris

DIMORPHODON: A PTERODACTYL FROM THE LOWER LIAS OF ENGLAND

Pterosauria, see PTERODACTYLS.

Ptolemaic System, system of the universe, as held by the Gk philosophers and physicists, and expounded by Ptolemy (q.v.). The earth, a sphere, is the centre of the universe, and the heavenly bodies move round it in circles. Earth, the stable element, occupies the lowest place, then water, the firmament, and the ether beyond. The 'crystalline' sphere of the heavens in which the stars were fixed revolved round the earth, and, to account for differing motion of other bodies, other spheres, contained within the great one, carried the moon, nearest, then Mercury, Venus, the sun, Mars, Jupiter, and Saturn in that order. There were thus 8 spheres. The system was full of difficulties, and later astronomers added a ninth sphere to account for the precession of the equinoxes, a tenth to cause day and night; this was the 'primum mobile.' The sun sphere had to be placed eccentric-

ally, a first movement towards discovery of the elliptical orbit, to account for variations in its motion. To account for the irregularities in the motions of the planets, the final form of the Ptolemaic scheme attributed 2 motions to each of the bodies. The first was a motion in a circle (the *epicycle*) round a centre, which in turn moved in a larger circle, known as the *deferent*, the centre of which was the earth. The motion of the sun did not conform to this scheme, it moved round the earth, the circumference of the circle lying between the deferents of Venus and Mars. The moon, known to be the nearest body to the earth, also moved in a simple circle round the earth.

Ptolemais, see **ACRE**.

Ptolemy, or **Ptolemaeus**, dynasty of Macedonian kings, who ruled in Egypt from 323 to 30 bc. The founder, **Ptolemy I** (323-283 bc), was the son of Lagus, one of Alexander the Great's most trusted gens. Egypt was his share of Alexander's conquests. He assumed the title of king in 305 bc. P. or Soter I commenced the great library and museum at Alexandria, where, under his patronage, Euclid taught mathematics; it was through him that the worship of Serapis was introduced. His name Soter (Saviour) was earned by the assistance he gave to the Rhodians when they were besieged by Demetrius (304). **Ptolemy II**, posthumously called Philadelphus (285-246), was chiefly famous for his splendid court and general delight in luxury, and his encouragement of commerce. His first wife was Arsinoë I, daughter of Lysimachus. After repudiating her he married his sister, the beautiful Arsinoë II, the widow of Lysimachus, and deified her at her death. P. built the great lighthouse at Alexandria known as the Pharos. He delighted in the library and encouraged all intellectual pursuits. Manetho, the priest historian, flourished during his reign. **Ptolemy III** (Euergetes I) (247-221), son of P. II and Arsinoë I. He married Berenice, the daughter of Magas. He invaded the Seleucid kingdom as far as Babylon, while his fleet was triumphant as far as Thrace. He left many monuments in Egypt, among them the unfinished temple of Edgu. **Ptolemy IV**, called Philopator (221-203), son of P. III. He married his sister, Arsinoë III. He was a debauchee who started the gradual decline of his kingdom. **Ptolemy V**, called Epiphanes (203-181), son of P. IV and Arsinoë III, was only 5 years old when he came to the throne. He married Cleopatra, daughter of Antiochus. His reign was chiefly remarkable for the cruelty displayed in the suppression of native rebellions. The Rosetta stone (q.v.) dates from his reign. **Ptolemy VI** (Philometor, 181-145) and **Ptolemy VII** (later nicknamed Physkon the Puffer from his bloated appearance, d. 116), sons of P. V and Cleopatra, came to the throne jointly and quarrelled continuously, Philometor being the better of the two. Rome intervened in their quarrels and P. VI's war with the Sel-

euroids. P. VII eventually retiring to Cyrene until P. VI's death, when he returned, murdered P. VI's son, and married the mother (his sister) and her daughter, also called Cleopatra. P. VII left Cyrenaica to an illegitimate son, and Egypt and Cyprus to Cleopatra (Kokkê) and his 2 sons by her, **Ptolemy VIII**, Soter II (nicknamed Lathyros or Chickpea), and **Ptolemy IX** Alexander I (d. 88). There followed a long period of domestic strife, the brothers ruling alternately in Egypt and Cyprus, until P. IX was killed in a rising, having melted down the golden sarcophagus of Alexander the Great to pay his mercenaries; after this, P. VIII ruled until 80. **Ptolemy X**, Alexander II (d. 80), son of P. IX, entered Alexandria with the support of Rome, married his step-mother Berenice III (q.v.), assassinated her, and was at once killed by the mob. He was the last of the legitimate line. **Ptolemy XI**, known as Auletes, 'the flute player' (80-51), an illegitimate son of P. VIII, was then chosen by the Alexandrians. He spent most of his reign trying to buy the support of influential Romans; and was at last recognised in 55, when he was restored after 3 years' exile. He left Egypt to his children, Cleopatra (q.v.) aged 17, and her brother **Ptolemy XII** (51-47), who assassinated Pompey (48) and perished in the war with Caesar, when his younger brother, **Ptolemy XIII**, was associated with Cleopatra and was soon poisoned. Caesarion, Cleopatra's son by Julius Caesar, was known as **Ptolemy XIV**. He was murdered by Octavian, 30 bc. See **EGYPT**. See also J. Mahaffy, *The Empire of the Ptolemies*, 1895, and Edwyn Bevan, *A History of Egypt under the Ptolemaic Dynasty*, 1927.

Ptolemy, or **Claudius Ptolemaeus**, astronomer and geographer, was a native of Egypt, and lived at Alexandria during the first half of the 2nd cent. ad. His chief works are the *Syntaxis* (a summary of Gk astronomy) and the *Geographia* in 8 books. His astronomical writings were the only authoritative work till the time of Copernicus. The *Geographia* remained authoritative until the 15th cent. Among other works are: *The Centiloquium*, a 'canon of kings' (chronological list of Assyrian, Persian, Gk, and Rom. kings), *De Apparentiis et significationibus Inerantium*, *De Analemata*, and *Plantapherum*. He wrote on the musical scale and possibly on optics. He discovered evection (q.v.), and extended the use of trigonometry. See also **PTOLEMAIC SYSTEM**.

All Gk works on P. have been superseded by Helberg's ed. of the astronomical work of P. (1899-1907), to which has been added a Ger. trans. of the *Syntaxis* by Manitius (1912-13). The eds. of Erasmus and Elzevir contain numerous errors. See 'Claudii Ptolemaei Geographiae' (ed. C. Müller, and C. T. Fischer in *Bibliotheca scriptorum graecorum*, 1883 and 1901); T. G. flylands, *Geography of Ptolemy*, 1893; L. O. T. Tudeer, *Studies in the Geography of Ptolemy*, 1927; J. W.

Kubitschek, *Studien zur Geographie des Ptolemäus*, 1934; and P. Schnabel, *Text und Karten des Ptolemäus*, 1938.

Ptomaines, poisonous bodies produced by bacterial decomposition of animal or vegetable proteins. They are not a chemically distinct group, for some (like putrescine) are amines, others (creatinin) are amino-acids, while neurine is tetra-methylvinyl-ammonium hydroxide. Not all the P. are poisonous, some being perfectly harmless. A supposed common property, which related them to the alkaloids, was their alkalinity. Creatinin, however, when pure, does not affect litmus nor does it combine with acids like a base. Putrescine, $(\text{CH}_2)_4(\text{NH}_2)_2$, and cadaverine, $(\text{CH}_2)_5(\text{NH}_2)_2$, are 2 well-known P. contained in putrefying albumen.

Ptoxis, drooping of the upper eyelid which may affect either or both eyes. The condition is caused by paralysis of that branch of the third motor oculi nerve which controls the raising of the eyelids. In some cases this may be a congenital condition. In acquired cases it may be associated with general disease or caused by local lesions.

Ptyalin, amylolytic ferment in saliva. Its function is to convert insoluble starch into dextrin and sugar. *See also* MOUTH.

Puberty, occurring between childhood and adolescence, is that period when, in both sexes, the generative organs become capable of exercising the function of reproduction. The changes that begin then and the full development of the body and mind take many years. In girls the form begins to develop and the menses appear, while in boys the voice 'breaks' and semen may be discharged. The change generally occurs more rapidly among girls than boys, and it is also noticeable that at this time their rate of growth is also quicker than that of boys. The age at which P. begins varies, and is determined, among other things, by climatic conditions, but in temperate climates, generally, it may be said to take place among girls at from 12 to 14 years, and among boys from 14 to 16. At this time care should be exercised, particularly with girls, because of the stress which the nervous system is subject to, and overstrain, whether physical or mental, should be guarded against.

Public Address Broadcasting, *see* LOUD-SPEAKER.

Public Assistance, term used since 1928 in Great Britain for poor relief. *See* POOR LAW.

Public Company, *see* COMPANY.

Public Debt. Matured states take a portion of the capital of the country in the form of a loan to meet the purposes of government. The ancient world of undeveloped political societies knew nothing of P. D. for the simple reason that mankind had not attained to the idea of investment generally; and, while commerce was in its infancy, govts., like individuals, relied upon hoarded treasure to meet temporary exigencies. In England, before the revolution of 1688, there

was probably no national debt. When the gov. of the day obtained grants from Parliament the monarch was formally released from his obligations. The kings of the 14th and 15th cents. raised loans under the name of benevolences, a practice constantly resorted to by later monarchs. Charles I strained the archaic and unpopular laws to raise money, while most of the Tudor and Stuart monarchs received subsidies from the Commons. But the indebtedness of the State was never acknowledged, and it would never have occurred to anyone that money ostensibly or in fact required for the purpose of carrying on a war or any other purpose of gov. was repayable at interest. Nearly the whole of the Brit. P. D. before 1807 (in 1866 it amounted to £805m.) had been contracted for 'unproductive' purposes, and the borrowing by present-day govts. for permanent public works ('productive' loans) is essentially a feature of the more liberal conceptions of the modern state.

The method of raising forced loans under the privy seal ceased at the beginning of the 17th cent. After the Restoration the customary mode of raising loans was by the issue of tallies in anticipation of revenue, though even when William III became king the actual recognised debt was no more than £84,888 6s. 9d., borrowed on tallies in anticipation of duties on Fr. linens (*Palgrave's Dictionary of Political Economy*). The beginning of the national debt may be said to date from the reign of Charles II, when the London goldsmiths began the practice of advancing money to the Exchequer on the security of an assignment of part of the public revenue. But it was not till 1694, when the Bank of England was incorporated, that it really became a permanent institution, as Charles II practically repudiated the State's indebtedness by ceasing to pay interest. On the grant of the bank charter, in consideration of a loan of over a million, Parliament reserved to itself the right to redeem the national debt at any time after 1705, with which redemption the charter of incorporation was to expire. It is a commonplace of hist. and economics that, far from redeeming, succeeding govts. merely increased their indebtedness. During Queen Anne's reign the P. D. amounted to £54m.; in 1763, after the Seven Years War, it reached £146m.; the Amer. War of Independence increased it by £121m., while at the close of the Napoleonic wars no less than £601m. was added, when it reached £900m. (1816), the ann. expenditure for interest and management being over £30m.

The ordinary sources of revenue have from time to time continued to be supplemented by loans, and a line of practical inquiry is that which is directed to devising some scheme for progressive reduction of P. D. Sir Robert Walpole, alarmed by the rapid increase in the P. D., instituted a sinking fund (q.v.) by the instrumentality of which a reduction in capital

amount to the extent of £7m. was effected before the beginning of the Seven Years War in 1756. Pitt created a permanent sinking fund in 1786; another was set up in 1875, and there have been others.

The disadvantages of a P. D. are in the popular mind more than outweighed by the public guarantee such a debt affords of a convenient form of investment, although at a low rate of interest. The P. D. has also been, perhaps, the principal means of establishing the general advantages of a banking system.

into account. The local side of public expenditure increased in the 19th cent. and until the Second World War. After 1945 this growth was checked by the transfer of electricity, gas, transport, and other public utilities from local to national ownership (see also MUNICIPAL TRADE).

United States of America. The P. D. of the U.S.A. in 1791 was \$75m.; it had fallen nearly 50 per cent by 1812, after which it rose to \$127m. During the following years it began gradually to decrease until 1836. After the civil

The following table shows the amount of the national debt of Great Britain at the dates specified (including the Irish debt):

Date	Debt £m.	Annual charge, including terminable annuities £m.
1727 (accession of George II)	52	2.4
1784 (end of Amer. War of Independence)	243	9.5
	Gross debt, including terminable annuities	Annual charge, including interest, management, and new sinking fund
	£m.	£m.
1815 (end of Napoleonic wars)	861	33
1903 (end of S. African war)	798	27
1914 (beginning of the First World War)	706	25
1923	6,657	324
1938	7,111	227
1945	21,237	465
1955	27,000	707

The P. D. of Great Britain is classified into: (1) the *Permanent or Funded Debt*, which the gov. is under no obligation to redeem at any stated time; (2) the *Unfunded Debt*, made up of loans repayable at certain dates; and (3) *Terminable Annuities*, by means of which the capital sum, at the expiration of the annuity, is written off the P. D.

The First World War, with its peculiarly difficult financial problems, caused the emergence of special measures with loans for war expenditure which small investors could take up, and resulted in a considerable inflation of the national debt of all the belligerents. The need for money in Great Britain saw war loans held not only on the books of the Bank of England but also on the post office register. Moreover, war savings certificates were introduced, becoming national savings certificates at a later date.

The national debt is administered by National Debt Commissioners, by whose agency measures for reduction, etc., are made. They do not, however, manage the sinking fund, or the Brit. debt to the U.S.A. For fuller details of the debt to America see DEBT and DEBT CONVERSION.

Local Debt (see also LOCAL TAXATION RETURNS; LOCAL TAXATION GRANTS). To ascertain the full indebtedness of the community to its members, the debt of local spending authorities must be taken

war it reached its highest point in 1866, when it amounted to \$756m. It subsequently fell until the Sp.-Amer. war, when it rose again.

United States Local Debt. Beside the gross national debt of the Federal Gov., the aggregate debt of the separate states,

U.S.A. PUBLIC DEBT

	\$m.
1914	1,188
1919	25,482
1925	20,516
1929	16,931
1930 (lowest post-war)	16,185
1935 (after the New Deal)	32,824
1945	259,115
1954	271,260

(The U.S.A. has no foreign debt; the figures show the total internal.)

mostly deficit and public works borrowings, is small and is greatly exceeded by the aggregate municipal debt.

The P. D. of commonwealth and foreign countries can be obtained from the U.N. statistical office *Monthly Bulletin of Statistics*.

See G. F. Shirras, *Science of Public Finance*, 1924, and *Federal Finance in Peace and War*, 1944; A. C. Pigou, *A Study in Public Finance*, 1928; W. Withers, *The Retirement of National*

Debit, 1932; J. M. Keynes, *How to Pay for the War*, 1940; and Ursula K. Hicks, *British Public Finances: Their Structure and Development, 1880-1952*, 1954.

Public Health. The preservation and improvement of P. H. through the coercive action of local governing bodies is a development of the later part of the 19th cent. Prior to that period it was considered no part of the duty of the state to control the physical environment of the individual. In 1845 a royal commission appointed to inquire into the causes of disease among the inhab. of tns reported to Parliament that the dists. inhabited by the labouring classes, and often by tradesmen in large tns and in many small tns, were in such a noxious state from want of drainage, cleanliness, proper ventilation, and adequate water supply, and from the prevalent overcrowding, that typhus, fever, cholera, consumption, scrofulous and other chronic complaints existed to an appalling extent. Modern P. H. methods are founded upon the studies of Sir E. Chadwick, Sir J. Simon (1816-1904), Dr S. Farr (medical jurist), and others regarding the effect of environment on health, and upon the researches of Pasteur (q.v.) and Koch (q.v.) in the science of bacteriology.

The first Public Health Act was passed in 1848. This Act provided for a General Board of Health (whose duties lapsed to the Privy Council in 1858) and gave populous areas powers to establish local boards to deal with matters affecting health, including the appointment of medical officers of health. The first medical officers of health to be appointed were Dr W. H. Duncan in Liverpool, in 1847, and Dr Simon (later Sir John S.) in the City of London in 1848. The appointment of medical officers of health by all local authorities was made compulsory in 1872. The next important P. H. Act was passed in 1875, and this notable piece of legislation, mainly concerned with environmental hygiene, remained in force, though amended in detail, until the passing of the Public Health Act of 1936. Among the more important Acts and regulations affecting the P. H. which were passed subsequently to 1875, and on which various services were founded, were the Factory and Workshop Act, 1901, Midwives Act, 1902, Education (Administrative Provisions) Act, 1907, Housing and Town Planning Act, 1909, Public Health (Tuberculosis) Regulations, 1912, Public Health (Venereal Diseases) Regulations, 1916, Milk and Dairies (Consolidation) Act, 1915, Maternity and Child Welfare Act, 1915, Ministry of Health Act, 1919, Blind Persons Act, 1920, Housing Act, 1925, Local Government Act, 1929, Public Health Act, 1936, Housing Act, 1936, Factories Act, 1937, and Food and Drugs Act, 1955. Some of these Acts have been partly or wholly repealed, and they are mentioned because they initiated or extended important P. H. services. Thus the school medical service, for the medical examination and treatment of schoolchildren, was estab.

by the above-mentioned Act of 1907. This Act is repealed and the relevant powers are now incorporated in the Education Act, 1944. Similarly with the other Acts mentioned, e.g. the Maternity and Child Welfare Act is repealed, but similar provisions were to be found in the Public Health Act, 1936, and in the National Health Service Act, 1946. The Ministry of Health was first established under an Act in 1919. The local Government Act, 1929, an Act of far-reaching importance, transferred most of the functions of the old boards of guardians to the councils of coas. and co. bors. (see LOCAL GOVERNMENT). The Public Health Act, 1936, Housing Act, 1936, and the Food and Drugs Act, 1936, consolidated previous legislation and were the prin. Acts under which the greater part of the duties of P. H. depts of local authorities were carried out until the passing of the National Health Service Act, 1946.

In detail public hygiene or health, as expressed in the Acts administered by the various local authorities, was concerned with sewerage and the disposal of waste matters of all kinds, drainage, and sanitary conveniences, the abatement of nuisances, the collection of refuse, and offensive trades; infectious diseases (including tuberculosis and venereal disease) and, generally, the prevention of infection from disease; midwives, maternity and child welfare; estab. of hospitals; unsound and adulterated food; burial and cremation; pollution of water; regulation of factories and workshops; housing and town-planning; estab. of mortuaries; lighting; ventilation; and regulation, generally, of dairies, cowsheds, and milk-shops, water supply, public baths and wash-houses, recreation grounds, and construction of buildings. It is unnecessary, however, in this article to consider either the machinery of local gov. or the general powers of local authorities, these aspects of the subject under consideration having been fully dealt with under LOCAL GOVERNMENT and MINISTRY OF HEALTH.

Sewerage. A local authority (i.e. a dist. or tn council) is bound to provide and maintain such sewers as may be necessary to drain their area, and may carry their sewers under any lands they choose, subject to compensation to the owner. As defined in the public Health Act, 1936, a drain serves only 1 premise, whereas a sewer receives drainage from 2 or more premises. Sewers include public sewers repairable by the local authority and private sewers repairable by the owner or joint owners. The local authority is bound to dispose of ordinary sewage matter, together with liquids from factories, but no injurious matter like chemical refuse or steam may be drained or let off into a sewer. Where persons responsible for trade premises want to discharge waste matter from them they must first apply to the local authority for permission to do so. The question of the disposal of sewage is dealt with under Sect. 14 of the Public Health Act,

1936, and that of the drainage of trade premises under the Public Health (Drainage of Trade Premises) Act, 1937. Separate Acts relate to the London Metropolitan area. Unpurified sewage may not be discharged into any stream or lake, and most of the larger rivers are protected in this respect by local Acts. The disposal of sewage matter has always been an economic problem, by reason not only of the cost of disposal without creating a nuisance, but also of the non-existence of any generally applicable effective method of saving money by the use of the sewage matter for manure or for any useful purpose, other than utilisation of sludge gas.

Drainage and Sanitary Conveniences. The duty of draining a house falls upon the owner or occupier. Usually, in large towns, houses are drained into the public sewers, but in the smaller towns and in thinly peopled districts, it is common to drain into cesspools. New houses must be drained into a sewer if there be one within 100 ft. of the premises. In default of the owner or occupier, the local authority is bound to effect a proper drainage, and can recover the cost from the owner or occupier. The local authority is empowered to enforce the provision of a proper water-closet or earth-closet in every dwelling-house, and to make by-laws for a compulsory water supply for flushing the first-mentioned kind of convenience. Town, metropolitan borough, and urban district councils alike have power to construct sanitary conveniences for public accommodation. See also SANITATION OF BUILDINGS; SEWAGE.

Abatement of Nuisances. (See under NUISANCE for the general legal conception of a public nuisance.) The nuisances which may be dealt with by a local authority are in practice limited to those expressly mentioned in various statutes (mainly the Public Health Act, 1936) as falling within their powers of abatement. A P. H. nuisance, unlike a common-law nuisance, is dealt with before a court of summary jurisdiction at the instance of the local authority. The law relating to these nuisances is now contained in Sect. 92 of the Public Health Act, 1936, which describes them as 'statutory nuisances.' They comprise: any premises; animals; accumulations or deposits; dust or effluvia from any trade, business, factory, etc., prejudicial to health or a nuisance; also any factory, workshop, etc., not properly ventilated or not kept clean or free from noxious effluvia, or so overcrowded as to be prejudicial to the health of the employees; and any other matter declared by the Act to be a statutory nuisance. The procedure is that the sanitary branch of the local P. H. dept serves on the responsible person an abatement notice, and if this is ignored the local authority goes to a justice of the peace, who issues a summons, and the court may then make a nuisance order requiring compliance or, in default, levy a fine, or the local authority may also abate the nuisance and recover the cost.

Collection of Refuse. The local authorities outside the London area may or may not undertake to collect house refuse. They usually do so, and free of charge; but if they undertake to collect trade refuse or garden rubbish they may make a charge. If they do not undertake the duty themselves, they may make by-laws imposing the duty on occupiers. In London, however, this duty falls upon the borough councils, the by-laws relative to it being drafted by the London County Council (L.C.C.).

Offensive Trades. Offensive trades, under Sect. 107 of the Public Health Act, 1936, are those of a blood boiler, bone boiler, fat extractor and melter, fell-monger, glue-maker, gut scraper, rag and bone dealer, size maker, soap boiler, tallow melter, or tripe boiler, together with certain trades, businesses, or manufs. which were offensive trades under an older Act of 1907, and also any other trades, etc., which the local authority, by order confirmed by the Ministry of Housing and Local Gov., declare to be an offensive trade in their district. It is unlawful to establish an offensive trade without the consent of the local authority, who may give consent to the establishment of an offensive trade for a limited period. The authority may make by-laws to prevent or diminish any injurious effects arising from offensive trades in their area. See under OFFENSIVE TRADES.

Notification of Infectious Diseases, and Disinfection of Premises and Articles. Under the Public Health (Infectious Disease) Regulations, 1927, certain infectious diseases must be notified by the head of the family to which the patient belongs (or, in his default, by any one in charge of the patient) to the district medical officer of health. The specified diseases are smallpox, cholera, diphtheria, membranous croup, erysipelas, scarlatina, scarlet fever, typhus, typhoid, enteric, relapsing, continued, and puerperal fever, consumption, and any other infectious diseases which the local authority may, with the approval of the Ministry of Health, add permanently or temporarily to the list. This was repeated in the Public Health Act, 1936, regulations under which Act or under similar sections of superseded Acts and various other diseases, including plague, cerebro-spinal fever, acute poliomyelitis, encephalitis lethargica, all forms of tuberculosis, ophthalmia neonatorum, acute primary pneumonia, dysentery, and malaria. Medical practitioners called in to visit the patient must also send certificates to the medical officer of health, stating the name and address of the patient and the nature of his disease. Keepers of common lodging-houses are also required to notify both the medical officer and the welfare officer of cases of infectious disease occurring in their houses. Power is conferred on local authorities by the Public Health Act, 1936, to remove to hospital an inmate of a common lodging house who is suffering from a notifiable infectious disease, and also on a court of summary

jurisdiction to order the closing of the common lodging house on account of the occurrence of such disease. By the Milk and Dairies Order, 1926, dairymen in districts where the Act has been adopted are bound to notify cases of infectious diseases occurring among their employees, and may also be required to disclose the sources of their milk supply. Where patients cannot be effectively isolated in the premises where they may happen to be, the police may, on an order of a magistrate or of the local council, and subject to the consent of the superintending body of the hospital, remove them to any suitable neighbouring hospital. Where the Infectious Diseases (Prevention) Act, 1890 (substantially re-enacted in Part V of the Public Health Act, 1936), has been adopted, the local authority may provide free temporary accommodation for the members of a family in which infectious disease has broken out while the council disinfects their dwelling. The local authority may provide nurses where the hospital has not sufficient accommodation for the patients. Under the Public Health Act, 1936, a fine of £5 may be inflicted upon a person who exposes himself in a public place or place of entertainment, when he knows he is suffering from a notifiable disease; or allows a patient under his charge to do so; or gives or sells or exposes infected clothing or bedding; engages in a trade or occupation involving risk of spread of infection; or allowing a child in his care to attend school when the child is suffering from such infection. (See also under LANDLORD AND TENANT as to letting infected premises.) Under the Public Health Act, 1936 (re-enacting the Infectious Diseases Notification Act, 1925), a local authority may pay the expenses of disinfecting bedding, clothes, and other things, if the disinfection be carried out by them or under their directions, and they may direct articles which have been exposed to dangerous infection to be destroyed, subject to compensation.

Tuberculosis. The administrative methods by which tuberculosis is controlled are separate and distinct from those in connection with other types of infectious diseases. Tuberculosis schemes in England and Wales were administered by co. and co. bor. councils and, in London, by the L.C.C. An organised service dealing with the disease was initiated under the Public Health (Tuberculosis) Regulations, 1911, which required notification of all cases of pulmonary tuberculosis. This requirement was extended to non-pulmonary cases in 1912. The present law is to be found in the Public Health (Tuberculosis) Regulations, 1930, and the Public Health Act, 1936 (Sects. 171-75), and in the National Health Service Act, 1946. Until the passing of the National Health Service Act, 1946, it was the duty of the council to make adequate arrangements for the treatment of persons in their area, at or in dispensaries, sanatoria, and other approved institutions and to make arrangements

for the after-care of persons who have suffered from tuberculosis. Now, under the National Health Service Act, the treatment of Tuberculosis is the duty of the hospital authorities, while arrangements for prevention and after-care remain the duty of the local authorities.

Maternity and Child Welfare. The forerunner of the modern child-welfare clinics was that which was opened in Paris in 1892 by Dr Pierre Budin, in which year, too, Variot estab. milk stations (*gouttes de lait*) where clean milk was distributed to poor mothers. This movement spread to England in 1899 through the estab. of a milk station at St Helens, Lancashire. The system of clinics and milk depots, largely carried on by voluntary societies, was regularised and put under the general supervision of the Ministry of Health by the passing of the Maternity and Child Welfare Act, 1918, now repealed and included in the Public Health Act, 1936 (Sect. 204). Notification of births was not made compulsory until 1915, though Huddersfield Corporation in 1906 had secured parl. powers for compulsory notification of births in that bor. A Midwives Act of 1902 estab. a board whose duty it was to publish a roll of certified midwives and to regulate their training and examinations. The Act of 1936 estab. in all areas of England and Wales a full-time service of midwives employed by local authorities or by voluntary organisations, and the National Health Service Act, 1946, estab. a complete domiciliary maternity service free of charge staffed by local authority midwives and doctors under contract with executive councils. In Scotland the Maternity Services (Scotland) Act, 1937, had already provided for the services of a doctor as well as of a maternity nurse at each confinement. The legislation which laid the foundation of the modern system of child welfare was comprised in the Notification of Births Act, 1907, and the Notification of Births (Extension) Act, 1915. The Act of 1907 was adoptive only, but the later Act made notification compulsory in all areas. Both Acts were repealed by the Public Health Act, 1936, Sect. 203 of which made compulsory the notification to the Ministry of Health of births in all areas. The onus of notification is upon the father, if residing in the house at the time of the birth, or any person in attendance at the time or within 6 hours of the birth; but in practice notifications are almost invariably made by the doctor or midwife (notification does not be confused with registration (q.v.)). The National Health Service Act of 1946 made it the duty of local authorities to provide antenatal and child-welfare clinics and the services of health visitors. The infantile mortality rate has steadily declined for many years (74 per 1000 in 1929; 53 in 1938; 48 in 1944; and 34 in 1950) and this rate is a fairly reliable index of the environmental conditions into which children are born and in which they spend the first 2 months of their lives; the fall which has taken

place is closely related to the improvements in the standard of life, in housing, dietary, and in education. Improvements in communal hygiene and the work of the child-welfare clinics are also factors to be taken into consideration. The law on the protection of children was contained in the Children Act, 1908, and the Children and Young Persons Act, 1932; the relevant sections were incorporated in Sects. 206-20 of the Public Health Act, 1936, which also contained some additional provisions. Sect. 206 made it necessary for any person who undertakes for pay the nursing and maintenance of a child under 9 years of age, apart from its parents or having none, to give notice to the welfare authority. The welfare authority must appoint child-protection visitors, whose duty it is to visit from time to time any foster children in their area and satisfy themselves as to the health and well-being of such children. The Childrens Act, 1948, provided a comprehensive service for the care of children who have not the benefit of a normal home life. Under it local authorities must appoint a children's Committee and a children's officer. The Ministry of Health, in conjunction with the Ministry of Education, institutes a system of inspection of school children for the purpose of checking malnutrition, and the maintenance of clinics where dental, eye, and other troubles may be treated.

Provision of Hospitals. Before the National Health Service Act, 1946, the public, as distinct from voluntary, hospitals were owned and managed by local authorities. The public hospitals sprang from the parochial system of the forty-third year of the reign of Queen Elizabeth I, and these parochial functions were later transferred to boards of guardians. Early in the 19th cent. all types of sickness, including cholera, typhus, and smallpox, were being treated in workhouse institutions. It was not until the passing of the Public Health Acts of 1866 and 1875, prompted by the cholera epidemics, that the local authorities set up by the Municipal Corporations Act, 1835, were empowered to build hospitals for infectious and other diseases. There were, prior to 1948, over 600 infectious disease hospitals, half of which were erected for the treatment of smallpox. The National Insurance Act, 1911, stimulated the growth of sanatoria for tuberculosis. Under the Local Government Act, 1929, all the functions of the boards of guardians were transferred to co. bors. and co. councils, including the treatment of the sick in hospital. The Metropolitan Asylums Board of London, which once administered the isolation and mental hospitals of London, was dissolved, and the hospitals of that area transferred to the L.C.C. These transferred hospitals became vested in Public Assistance Committees, the intention of Parliament being that the hospitals so transferred should be operated, not under the Poor Law Acts, but under the Public Health Acts. By 1936 almost

all the public hospitals in England and Wales had been so transferred—numbering 577, with about 130,000 beds; while the other hospitals in the ownership of local authorities, including isolation hospitals, maternity homes, and sanatoria, numbered in 1939 an additional 1200 with nearly 60,000 beds. Whilst some of the hospitals transferred were modern in character, others were buildings erected originally as workhouses and were in need of much adaptation in order to function as hospitals. The mental hospitals and institutions for the mentally defective were generally managed by cos. and co. bors. There were before the Second World War about 1000 voluntary hospitals, containing 90,000 beds. The Health White Paper (1944) was proposed to create joint regional authorities for the administration of services, such as hospitals and specialist treatment, which could be made fully effective only if they could draw on the resources of areas larger than those of most existing local authorities. In conformity with the institution, by the National Health Service Act, 1946, of a comprehensive national health service available to all, and for which the minister of health is responsible, provision was made for the minister of health to take over all voluntary and public hospitals, subject to the teaching hospitals being given special treatment. Supplementary services, such as midwifery, maternity, and child welfare, are provided through the local authorities. Regional hospital boards to administer the hospital and specialist services were set up in about a score of regions, each large hospital or related group of hospitals having a management committee. Except in the case of voluntary teaching hospitals, endowments were to pass to a new fund, which the minister of health would administer, the capital value of the fund being apportioned among the regional boards, and the income from each portion passing to the boards. *See further under NATIONAL HEALTH SERVICE ACT, 1946; HOSPITALS.*

Unsound and Adulterated Food. Both the medical officer of health and the sanitary inspector have power to seize any unsound article sold or exposed for sale and intended for the food of man, and to take it before a magistrate, who may condemn it and order its destruction, and fine or imprison the owner or person in whose possession it was found. Under various Acts local authorities have power to make by-laws for preventing the sale of unwholesome provisions in markets or fairs. There are also stringent statutory provisions against the sale of adulterated butter or milk; and samples of butter, margarine, and milk may be taken by the public analyst, or any one acting on his behalf, without warning of his intention to analyse. Vendors of horseflesh are bound to indicate the nature of their business by a conspicuous notice outside their premises. The legal standards of cow's milk are described in the Sale of Milk Regulations, 1939. Under Sect. 24 of the Food

and Drug Acts, 1938, now the Food and Drugs Act, 1955, it is forbidden to add any water or colouring matter, or any dried, condensed, or separated milk to milk intended for sale; it is illegal to sell as milk a mixture of cream and separated milk. The Milk and Dairies Order of 1926 was passed with the object of improving the conditions under which milks produced. It contains many provisions for securing cleanliness, including provisions for cattle inspection, cleanliness of dairies, and workers in them, and of conveyance and distribution. Pasteurisation is provided for in the Milk (Special Designations) Order, 1936 and 1938. This includes tuberculin-tested milk. Sect. 25 of the Food and Drugs Act, 1938, prohibits the sale of tuberculous milk. Cream which is artificial must be so labelled (Food and Drugs Act, 1938). The sale of dried milk is governed by regulations of 1923 and 1927, and similarly condensed milk. The Food and Drugs Act also contains provisions on the adulteration of butter and the moisture content of butter and margarine. The use of chemical preservatives for food is strictly limited by the Public Health (Preservatives, etc.) Regulations, 1925 and 1927. Other regulations for the control of food deal with slaughtering, meat marking, and the handling and sale of meat.

Pollution of Water. See *Sewerage* above and **WATER SUPPLY**.

Regulation of Factories and Workshops. See **FACTORY LEGISLATION**.

Housing and Repair of Houses. This wide subject is dealt with under **HOUSING**. But it may be mentioned here that although the Public Health Act enables the P. H. dept to require repairs to buildings other than houses, the extent of the repairs which can be enforced is much more limited than by using powers under the Housing Act. Repairs under the Public Health Act must come into the category of defects which are prejudicial to health or a nuisance (Sect. 92). Thus a dwelling-house or an office building with a leaky roof, defective downspouts, drains, or sanitary conveniences may come within the provisions of Sect. 92 of the Public Health Act, 1936, because such defects may be either nuisances or injurious or likely to cause injury to health. But worn floor-boarding, broken or missing rails to staircases, defective doors, broken plaster are by no means either nuisances or injurious to health, and can be dealt with only under the comprehensive powers afforded by the Housing Act. While, however, powers to enforce repairs, under the latter Act, can be used once only within a period of years, notices under the Public Health Act in respect of minor repairs can be, and are, served repeatedly as often as defects, properly coming within that Act, are discovered.

Water Supply. It is the duty of the local authority to provide a general supply of water if danger to health arises from unwholesomeness or insufficiency of the existing supply. This is without prejudice to their powers to compel owners of

houses to provide a supply of water thereto (Public Health Act, 1936, Sect. 3). The prin. act is now the Water Act, 1945. It has been amended by the Water Act, 1948, and to a minor extent by the local Government (Miscellaneous Provisions) Act, 1953. Par. councils may utilise wells, springs, or streams for water supplies. Local authorities may make by-laws for preventing contamination, waste, or misuse of waters of a public supply. They may also close or restrict the use of water from a polluted source (Sect. 140).

Public Baths and Wash-houses. Where a local authority have adopted the Baths and Wash-houses Acts, 1846-99, since extended by the Public Health Act, 1925, they may purchase or lease existing baths in or near their dist., or erect baths and wash-houses or provide open-air bathing places, together with all necessary furniture and appliances.

Recreation Grounds. Most tn and dist. councils have full power to provide pleasure and recreation grounds and to regulate the use of the same. In the administrative co. of London, where such grounds or 'lungs' are recognised to be vital to P. H., the L.C.C. and the various bor. councils have power, under the Open Spaces Act, 1906, and the Metropolis Management Acts, to purchase or lease ground for this purpose. The National Parks and Access to the Countryside Act, 1949, also aims at the preservation of open spaces.

Construction of Buildings. Under Sect. 61 of the Public Health Act, 1936, power is given to local authorities to make by-laws in respect of the construction of buildings, and for their guidance in such matters the Ministry of Housing and Local Government have issued a series of model by-laws indicating a desirable standard. The main object of these by-laws is to ensure the construction of houses whose walls shall be of proper thickness, materials, and construction adequate to resist fires (*see also* **FIRE WALL**), foundations and site consistent with the health of the inhab., and the sanitation, access at the rear, lighting and so forth, strictly conformable to all reasonable requirements. Provisions made in the London Buildings Acts, 1930-9, are noteworthy. *See also* the article **HOUSING**.

Port Health Administration. This is mainly a matter for the Ministry of Transport under the Merchant Shipping Act, but port health authorities are constituted by the Ministry of Housing and Local Government, which exercise over shipping within their area functions similar to those of sanitary authorities on land. Port health authorities (previously known as Port Sanitary Authorities) are constituted under the Port Sanitary Regulations, with powers derived, now, from Sects. 2-10 of the Public Health Act, 1936. Thus the master of every ship coming from abroad must notify, by wireless, to the Port Health Authority the existence of any person suffering from some notifiable infectious disease. The

authority can appoint medical officers (commonly referred to as boarding medical officers) to examine persons suffering from infectious diseases, and to require the master to take steps for the destruction of vermin. The duties of the authority also include the supervision of all imported foodstuffs intended for human consumption.

In the U.S.A. the various states have P. H. services similar to those of Great Britain adjusted to their individual needs. The International Health Div. of the Rockefeller Foundation has granted a generous donation for the purpose of educational tours for the teaching of hygiene. These tours cover such departments of P. H. as administration for P. H. officials, specialists in tuberculosis, infant hygiene, school hygiene, the health administration of ports, and demographic statistics, etc. The League of Nations estab. a special health committee and pub. monographs on the organisation and working conditions of P. H. services in different countries of the world, besides issuing the *International Health Handbook*. A constitution for a World Health Organisation (of which the League of Nations had made an important beginning) was agreed upon by the U.N. in Paris in June 1946 (see *WORLD HEALTH ORGANISATION*). See also *HYGIENE; HOUSING*.

The bibliography on the subject is enormous, but for the most part each authoritative text-book covers the same ground. The bibliography at the end of the article on *LOCAL GOVERNMENT* will apply to this article. See G. Newman, *The Building of a Nation's Health*, 1939; W. M. Frazer, *Text-book of Public Health* (13th ed.), 1953; J. J. Hanlon, *Principles of Public Health Administration* (2nd ed.), 1955; K. W. Taylor (Ed.), *Examination of Water and Water Supplies* (6th ed.), 1949; J. Moss, *Health and Welfare Services Handbook*, (2nd ed.), 1955; and ann. reports of the Ministry of Health.

Public Health Engineers, Institution of, only examining body of its kind, was founded in 1895, and incorporated in 1916. Its purpose is to promote the interests of public health engineering, and assist in all objects that tend to raise the status of this branch of science, including the nomination of delegates to professional committees and conferences or by active opposition to or amendment of Acts of Parliament when considered necessary. Examinations are held twice a year in Britain, and periodically in Australia, Brit. W. Indies, Ceylon, and S. Africa. The subjects cover a very wide range, and embrace all those which should come within the purview of the modern public health engineer. The institution has 5 dist. centres in the Brit. Isles, and has representatives in Australia, Brit. W. Indies, Ceylon, India, and S. Africa, and is affiliated, through its inner group, to the Federation of Sewage and Industrial Wastes Associations of the U.S.A. Its council and 4 committees sit regularly throughout the year, and arrange for

technical papers to be read, which are printed in the Jour. pub. quarterly, and for visits from time to time to engineering works of interest. It has a membership of well over 1200, comprised of the following grades: Honorary fellows, fellows, members, associate-members, associates, and students. The offices are at 118 Victoria Street, London, S.W.1.

Public Holidays, see *BANK HOLIDAYS*.

Public Houses, see *INNS AND INN-KEEPERS AND LICENCES AND LICENSING LAW*.

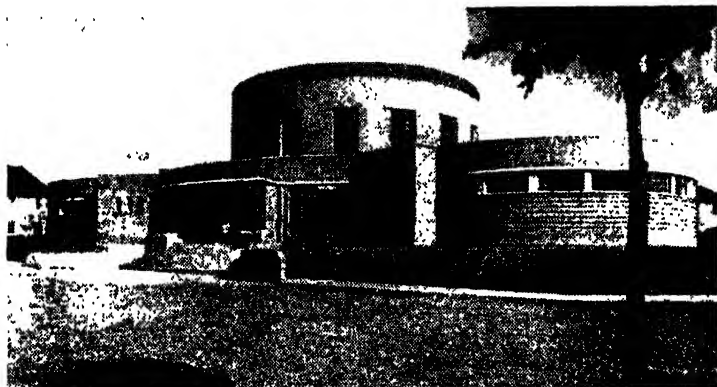
Public Liability Insurance, see *INSURANCE*.

Public Libraries. The estab. by municipalities in England and Wales of libraries free and open to all ratepayers out of funds provided by the rates was first authorised by the Public Libraries (England) Act, 1850, largely through the efforts of William Ewart, M.P. for Dumfries, although a public library, claimed to be the first in England, was instituted in Warrington, Lancs, in 1848, and various endowed free libraries existed long before this date. The rate was confined to $\frac{1}{4}$ d. in the £, but it was extended to 1d. in 1855, at first the proceeds going to provide the building only, no provision being made for the purchase of books. The right to establish was, and is, permissive and not compulsory, and until 1893 the power of adopting the Act was left to a vote of the rate-payers; now, except in rural parcs, the power rests with the local authority. The presentation of the buildings by Andrew Carnegie and others to many municipalities adopting the Acts further encouraged the growth of the public-library movement, but the limitations of the penny rate threatened the development of many libraries and led eventually to the Act of 1919, in which the rate limit was abolished and co. councils allowed to set up libraries in those areas which had not already done so. Since 1919, the main developments have been the rapid progress of the co. libraries, the consolidation of the municipal libraries, and the introduction of interloan systems and subject specialisation through library co-operation (see *LIBRARIES*). All P. L. are administered by the local authority through a libraries committee or sub-committee, its members elected by and from the council, with possibly some co-opted members; most co. libraries are governed by a libraries sub-committee of the Education Committee, and so come directly under the Director of Education. The number of depts and branches will depend on the size of the authority it serves, but most libraries of average size will have a reference library open to all, but from which no books are lent; a general lending library of fiction and non-fiction for residents and persons working in the area; and a children's library usually housed in a separate room, which may also be used for story hours, play readings, and other activities which may encourage children's interest in reading and books. In addition to these services, and par-

ticularly to attempt to serve small and scattered communities, co. libraries may deposit boxes of books, exchanged at intervals, at schools and institutes, operate a postal service to students, and have travelling libraries which call at rural factories, villages, and farms. Many libraries, too, have special collections of books on local hist. or a chosen subject, perhaps one with local connections, such as the collection of books, pamphlets, etc., relating to Gloucester public library (5,000 books, 40,000 pamphlets), and the Shakespeare collection at Birmingham.

In Ireland public-library systems followed a similar course to that in England, the first Act being passed in 1855, but in Scotland the movement has been con-

indefinite number of persons at any appointed place so long as they do not thereby break the law. This principle is a mere application of the constitutional liberty of the subject, and to understand the limitation of that principle it is only necessary to define an 'unlawful assembly' and to specify the various acts in places of public resort that are forbidden by statute or local by-laws. An unlawful assembly is generally defined as a 'meeting of great numbers of people under such circumstances of terror (by reason, for example, of their weapons or generally menacing attitude) as cannot but endanger the peace and raise fears in the minds of reasonable people of the neighbourhood.' The knowledge by an agitator or other person convening a meeting that his appearance



Leicester City Libraries

SOUTHFIELDS BRANCH LIBRARY, LEICESTER

siderably hampered by the expenditure being limited to the product of a 3d. rate, which was not changed until 1955. Another disadvantage is the system of double rating in operation, by which burghs contribute through the education rate to co. libraries as well as their own library, but in spite of this Glasgow and Edinburgh P. L. are among the foremost P. L. in the country.

Today all but 0.05 per cent of the people of the Brit. Isles have access to a public or co. library by some way or another. In the year 1955-6 it was estimated that nearly 400,000,000 loans were made from a total stock of 63,000,000 books available in the P. L.s of this country. See W. A. Munford, *Penny Rate*, 1951; E. V. Corbett, *An Introduction to Public Librarianship*, 2nd ed., 1953.

For public libraries of other countries see LIBRARIES.

Public Meeting. It is a somewhat unconstructive principle of Eng. law that any person may meet another person or an

is likely to provoke a breach of peace, according to the better opinion makes the meeting *ipso facto* unlawful. Among acts by meetings forbidden in public places are the blocking up of public thoroughfares or interfering with the general convenience of other people, or the annoying thereby of tenants of adjacent houses. The general principle is that a public thoroughfare is provided for no other purpose than to provide a means for the public of passage and repassage. A place of public resort like Trafalgar Square or Hyde Park is analogous thereto, and, strictly, persons have no right whatever to hold P. M.s for the discussion of any question, whether social, religious, political, or otherwise. See also PUBLIC ORDER ACT (1936).

Public Money, see CONTRACT.

Public Opinion, resultant of individual opinion and wishes on questions of public life. The existence of an informed P. O. is an essential basis for a strong democratic system. The spread of education amongst

the broad mass of the pop., and especially the inclusion of civics, i.e. a knowledge of the working of national and local gov., is a necessary foundation, and book publishing free from the control of the gov. of the day has long been recognised as essential for the expression of P. O., and for the provision of facts upon which it can be based, to which has been added in more recent years the use of radio film, and TV. The possibility that these and similar media could be used to mould P. O. according to the wishes of the ruling party has been demonstrated with especial force by the totalitarian systems of the 20th cent., with the necessary corollary of a rigid censorship. P. O. has become a matter for attempted scientific investigation, usually by the technique of sampling (see GALLUP POLL), and the historical study of P. O. at various periods, and, for example, in connection with particular elections, has been undertaken.

Public Order Act (1936), passed at a time when various para-military organisations, in imitation of the Fascists and Nazis, adopted black, brown, green, or other distinctive shirts, marched in procession, and held political meetings which not infrequently led to disturbances of the peace. This development was in the nature of things far more marked on the Continent than in Britain, where, however, there were occasional clashes between the 'black shirts' of the Brit. Union of Fascists and the Communists. The P. O. A. prohibits both para-military organisations and the wearing of uniforms in connection with political objects. It also gives powers to the police for the preservation of public order on the occasion of processions. If the chief of police, having regard to the time or place at which, and the circumstances in which, any public procession is taking place or is intended to take place and to the route proposed, has reasonable ground for apprehending that the provocation may occasion serious public disorder, he may give directions imposing upon the organisers or participants such conditions as seem necessary for keeping public order, including conditions prescribing the route. No conditions, however, restricting the display of flags, banners, or emblems may be imposed by the Act, except such as are reasonably necessary to prevent risk of a breach of the peace.

Public Prosecutor. This officer's duty is to take criminal proceedings under the superintendence of the attorney-general, in cases of importance or great difficulty, or in cases where, from the unwillingness or failure of the person aggrieved to prosecute, it is desirable in the public interest that the offender should not escape justice. In cases of importance or difficulty the P. P. must give advice to clerks of justices and to chief officers of police and other persons concerned in the proceedings. He may also assist private prosecutors by authorising them to incur special costs to obtain scientific evidence or the help of counsel. The office, prior to 1908, was held by the solicitor for the

time being to the Treasury, but is now a separate office. For U.S.A. see STATE ATTORNEY.

Public Record Office, archives of the central gov. of Britain, ant and modern. Few records have survived from the period in which administration was carried on in the king's court without any great degree of specialisation of function. With the developing scope and activity of the royal gov. increasing specialisation was introduced, as the surviving records show. Domesday Book (q.v.), compiled at the end of the 11th cent., is of outstanding importance. The first Pipe Roll is preserved from 1131, the first Receipt Rolls from Henry II's reign, and the first Memoranda Rolls from that of John; Exchequer Enrolments date from the 12th cent., and the Plea Rolls which survive from the reign of Richard I witness a well-developed judicial organisation. In a third stage the constant growth of business and staff produced recurring subdivisions of gov. depts and their records, as, for example, the Curia Regis (q.v.), divided at least from the beginning of the reign of Henry III. Moreover, the depts 'ceased to follow the king' and his perambulatory court, and by necessity acquired a fixed location for business, staff, and records. The Tudor period saw sev. innovations, new machinery of gov., new courts, and the introduction of directing 'boards.' The chief contribution of the period was the implementing of an existing tendency: secretaries finally became, as secretaries of state, the chief executive officers for domestic and foreign affairs, and a special repository was (1578) provided for their papers (the State Paper Office). The modern Treasury and Admiralty were estab. in the succeeding century. The close of the 18th and the first three-quarters of the 19th cents. were a period during which the administrative divs. which had evolved from medieval times were reformed and modernised.

The first repository for official documents was in the Treasury of the Receipt in Westminster, where records were housed until the opening of the 19th cent. The ever-more numerous sections of the administration, however, began to look after their own records, in repositories in many places in London. The work of scholars like Dugdale, Madox, and Rymer, whose *Foedera* appeared in 1704-17, caused a growing awareness of the treasures of historic material which lay in the neglected records. In 1703 the House of Lords committees were set up to consider 'the Method of keeping Records in Offices' and 'Ways to remedy what shall be found to be amiss.' Their reports appeared in 1719; in 1732 there was a report on the fire in the Cotton Library, and others of the same century dealt with specific repositories. It was not until 1800, however, that a truly comprehensive report appeared, namely that of the 'Select Committee appointed to enquire into the State of the Public Records.' A series of 6 commissions,

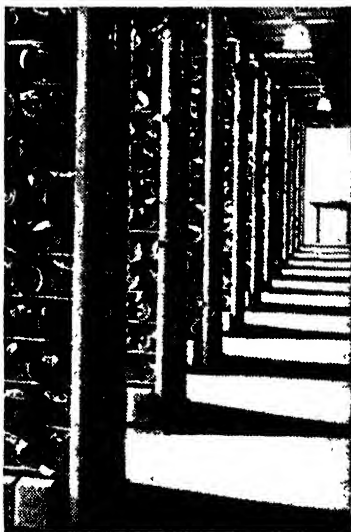
collectively called 'The Record Commission,' was appointed, and produced reports in 1812, 1819, and 1837. Criticism of their work led to inquiries by a House of Commons Select Committee, whose report of 1836 included a plan for the collection of public records into one place under one authority, the former being Chancery Lane, and the latter the master of the rolls.

The first and most important of the statutes by which the work of the dept is still regulated is the Public Record Office Act of 1838, resulting from the report of 1836. The Act of 1838 placed in the charge and superintendence of the master of the rolls records in specified record offices and courts of law, and provided that other records of the Crown might, by Order in Council, also be brought under his charge and superintendence. Such an Order was made in 1852, bringing into his jurisdiction 'all records belonging to her majesty deposited in any office, court, place or custody.' An Act of 1877 set up a procedure to determine whether or not any given class of documents were of sufficient 'value to justify their preservation' in the P. R. O., and to regulate their elimination if they were not. An Act of 1898 extended from 1715 to 1660 the dates of documents to which the Act may apply.

The existing situation is as follows. All documents in gov. depts, and divs. (except the court of probate) of the supreme court and in older royal courts, are in the charge and superintendence of the master of the rolls and may be, and are, removed into his custody by 'counter-signed warrant.' The P. R. O. has absolute discretion as to the administration of these, usually known as the legal section. For 'departmental' records, though many transfers have been made, no warrant has in practice been used; thus they are held to be still the property of the transferring depts (though in 'charge and superintendence' of the master of the rolls), who may requisition and withdraw them, and are prime movers in making transfers, and in controlling their frequency, volume, and scope, and the extent to which the public may have access to them; the P. R. O. has, however, a recognised advisory capacity, and the master's rules lay down conditions under which transfers will be accepted.

The conservation of the records includes their assembling and housing, and the elimination of unwanted documents; their sorting, numbering, labelling, and listing, and their distribution and packing; the provision of summaries of their location; and their repair and binding. The making of the records available to students entails the provision of means of reference and of public search rooms, and includes photographic facilities and publications. The P. R. O. uses 6 forms or methods of publication: transcripts (full text with extended abbreviations), calendars (precis, usually in Eng., full enough to replace the original for most purposes), descriptive lists (short abstracts of

documents), indices (alphabetically arranged references to persons, places, and subjects), lists (varying from an enumeration of the units composing a class of records to an attenuated descriptive list), and catalogues (giving lists of records of similar form or content drawn from different groups or classes for some special purpose).



Courtesy of the Public Record Office

PUBLIC RECORD OFFICE:
THE ROLLS ROOM

The Act of 1877 provided for the making by the master of the rolls of rules covering the disposal of documents not worth preserving in the P. R. O. and for the submission to Parliament of schedules of such documents. The prin. rules now operative were made in 1890. The effect of the Act and rules is that documents existing and accruing in gov. depts may not be disposed of unless they are covered by a schedule submitted by a body of inspecting officers of the P. R. O. and a representative of the dept concerned, who must see that the schedule includes no classes of documents of legal or historical interest, or giving important information not to be found elsewhere.

A committee under the chairmanship of Sir James Grigg was appointed in 1952 to review the arrangements for the preservation of departmental records 'in the light of the rate at which they are accumulating and the purposes which they are intended to serve.' The committee's report (1954) recommended the repeal of the present Public Record Office Acts;

the transference of the headship of the P. R. O. from the master of the rolls to a minister of the Crown; and a new 'Records Administration' system, under which depts would be responsible for the work of selection and transfer of records for preservation and the P. R. O. for supervising and co-ordinating their work. Steps are being taken (1957) to give effect to the proposed changes, and the P. R. O. is becoming one of the lord chancellor's depts.

The P. R. O. building in Chancery Lane, begun in 1851 and completed in 1900, contains the prin. repository, the search rooms, and a museum. There is a branch repository at Ashridge, Herts. Since 1948 the P. R. O. has also, under its Records Administration Officer, maintained an 'intermediate repository,' where depts can store records which have passed out of active use but have not yet been scrutinised with a view to final disposal.

The use of photography for the reproduction of records has steadily developed; photostat machines were employed after the First World War. To-day the reproduction of documents by a number of photographic processes is undertaken officially, and the descriptive lists pub. by the P. R. O. provide a means of selecting documents for one or other of these processes.

Activities of the P. R. O. outside the Act include the supervision of manorial records and local copies of tithe apportionments. See Royal Commission on Public Records (1910), *First Report*, 1912; M. S. Gluspepi, *A Guide to the Manuscripts Preserved in the Public Record Office*, 1923, 1924; V. H. Galbraith, *Introduction to the Use of Public Records*, 1934; and *Guide to the Public Records: Part I: Introductory* (H.M.S.O.), 1949; *Committee on Departmental Records: Report* (H.M.S.O.), 1954.

Public Relations, defined by the Institute of Public Relations as 'the deliberate, planned and sustained effort to establish and maintain mutual understanding between an organisation and its public.' The first use of the term 'public relations' is thought to have been in 1807, when President Thomas Jefferson, drafting his *Seventh Address To Congress* in his own hand, scratched out the words 'state of thought' in one place and wrote in 'public relations' instead. The term may be comparatively modern, but the ideas underlying P. R. have been appreciated since the earliest civilisations. In the Fr. Revolution, and in practically all popular uprisings, the events testified to the great power of public opinion when mobilised in a specific direction. In the Amer. Revolution the ground was prepared by the voices and pens of Samuel Adams, Thomas Paine, Benjamin Franklin, Alexander Hamilton, and Thomas Jefferson, who had a profound effect on the public opinion of their day. They circulated pamphlets, wrote in the press, lectured, and spread their ideas of revolt by word of mouth. The Eng. pamphleteers of the 18th cent. such as Jonathan

Swift and Daniel Defoe, were able exponents of P. R., and so, too, were Huxley, in promoting the evolutionary ideas of Darwin, and Charles Dickens, in his successful onslaught on the social evils of his time. Many of the techniques and principles of P. R. that are used to-day derive from the work of Ivy L. Lee, who started working for John D. Rockefeller, junior, in Dec. 1914 and succeeded in changing the public image of John D. Rockefeller, senior, from a 'greedy old capitalist' to a kindly old man who gave dimes to children and millions to charity. During the First World War, President Wilson set up a Committee on Public Information under a journalist, George Creel. Among those working for this successful Creel Committee was Edward L. Bernays, a nephew of Sigmund Freud, whose book *Crystallizing Public Opinion*, pub. in 1923, was the first full-length book dealing with P. R. In Britain the start of organised P. R. is generally agreed to have been the estab. of the Empire Marketing Board in 1926 under Sir Stephen Tallents with the object of 'bringing the Empire alive to the mind of people in Britain.' The success of the Empire Marketing Board, and the news of the spread of P. R. in the U.S.A., encouraged the expansion of P. R. in Gov. depts such as the Post Office, in local gov., and in many branches of industry. When the Second World War came, the Brit. Gov. acknowledged the value of P. R. by the estab. of the Ministry of Information (q.v.), the setting up of P. R. depts in Gov. depts, and the formation of P. R. units in all branches of the Services. Since the end of the war, the increasing industrialisation and intensification of life has created the need for planned P. R., and the development of new means of communication has provided the tools. To the support of the traditional media of the written and spoken word has come the powerful voice of radio; and visual aids, such as the cinema, television, and exhibitions, also play an important part in mass communication. In Britain P. R. has not become so universal as in the U.S.A., but since the end of the war its value has become appreciated by industry and it has become acknowledged as an essential part of central and local gov. It is also used by trade and professional associations and by societies of all kinds. This growth of appreciation of the value of P. R. owes much to the work of the Institute of Public Relations (I.P.R.), which was formed in 1948. This professional body now has nearly 1000 members, and examinations in P. R. were instituted in 1957. Its aim is to raise standards of practice and to encourage the fullest use of P. R. in Britain. The I.P.R. includes members from over 20 other countries, and its constitution has served as a model for many of the newly-formed P. R. associations in overseas countries. Arising from these contacts between practitioners in many parts of the world, the International Public Relations Association was estab. in 1955

with Norway, Holland, U.S.A., France and Great Britain as the founder members. The scope for the greatest expansion in P. R. in Britain is in the field of industry, where it is less developed than in central gov. It has now become the custom for the Prime Minister to have an adviser on P. R. on his staff, and the Gov. includes a senior minister with responsibilities for the nation's P. R. The Central Office of Information (q.v.), or C.O.I., succeeded the war-time Ministry of Information, but unlike its predecessor has no responsibility for policy and acts mainly as a service dept for the Gov. and official bodies. The C.O.I. has achieved a high standard in all branches of its work. The function of P. R. in central and local gov. is to explain democratic processes, encourage the fullest use of social services, interpret complicated legislation, and generally to promote understanding between legislators and the people.

P. R. covers all means of communication between an organisation and the public, including radio, television, films, public meetings, lectures, pamphlets, books, articles, posters, advertising, window displays, reports in the press, etc. The work of a P. R. officer is likely to involve the use of many of these media. In some instances, however, use is made only of the press and broadcasting, and in such cases the work is often known as press relations; a press relations officer carries out P. R. in a comparatively restricted field. In many Gov. depts there are press officers employed in the P. R. dept.

P. R. in the U.S.A. developed very quickly during the Second World War, and the technique was practised widely on behalf of industrial firms, public organisations, univs., etc. A certain amount of public antagonism developed, however, when P. R. techniques and methods were employed to support political pressure groups. The efforts of the Public Relations Society of America, with its strict code of ethics, have succeeded in restoring public appreciation of the value of P. R. as distinct from propaganda (q.v.).

See: BRITISH BOOKS. I. Harvey, *The Technique of Persuasion*, 1951; P. Hayle, *Industry and Press Relations*, 1957; Sir S. Tallents and others, *A Guide to the Practice of Public Relations*, 1957.

AMERICAN BOOKS. M. Wright, *Public Relations for Business*, 1939; D. H. Plackard and C. Blackman, *Blueprint for Public Relations*, 1947; J. H. Wright and B. H. Christian, *Public Relations in Management*, 1949; E. L. Bernays, *Public Relations*, 1952; V. Burnett, *Solving Public Relations Problems*, 1952; S. M. Cutlip and A. H. Centre, *Effective Public Relations*, 1952.

Public Revenue. The income-yielding assets of the State (Britain) are the Crown lands and certain investments. Dividends from these shares are paid directly into the Consolidated Fund. The commissioners of Crown lands collect the

rents arising from the properties and pay the proceeds as net revenue. Of the fees received by depts, the receipts of the post office are the largest, so large that the post office is classed as one of the revenue depts. Many other depts collect minor sums, and some pay these receipts directly into the Consolidated Fund. But the majority treat their receipts as appropriations in aid, the receipts being paid into the paymaster-general's cash account, where they are placed to the credit of the services concerned and the depts draw a proportionally smaller sum from the Exchequer for their voted expenditure.

But all these sources of P. R. are trifling compared with taxation, a fact which was still further emphasised during the Second World War, when the rate of income tax and surtax rose very sharply. The Board of Inland Revenue collects direct taxes, the chief items of which are income tax, surtax, and estate duties; while the collection of indirect taxes is the prov. of the Board of Customs and Excise. The accountant and comptroller general, who is the head of the financial dept of the Board, receives from the local collectors a statement of receipts (and payments for expenses) and from the surveyors' reports he can ascertain the amount of duty which should have been collected and paid in. The accountant and comptroller general transfers money daily from the general account of the commissioners of Customs and Excise to the Consolidated Fund at the Bank of England, retaining a certain sum for current expenses. In order to avoid unnecessary transfers of money the revenue depts draw upon their receipts for expenses, and moneys so used are treated as advances on account of the vote. The Board of Inland Revenue treat departmental expenditure in the same way. They, too, draw money from their general account to pay for rate expenditure, and the money is periodically repaid by the Treasury.

Taxation and the other sources of P. R. (Great Britain) in the financial years 1938 and 1955 were as shown in the table on p. 306.

The older economists distinguished between direct and indirect taxation. Modern economists have shown that the incidence of so-called direct taxes is often on other persons than those primarily intended to bear the burden, and, conversely, that many indirect taxes are in reality direct. (Thus some stamp duties are a direct deduction from income, while frequently indirect taxes on commodities remain on the shoulders of those from whom they were originally collected in spite of the economic assumption that they are passed on.)

Economic significance fastens on the extent to which taxes can be passed on; the important distinction is not the purely administrative one between direct and indirect taxes, but the economic one between income (and capital) taxes, which cannot be passed on, and outlay taxes

	1938	1955
	(£m.)	
1. Direct taxes on income		
Income tax	312	1941
Surtax	59	132
Profits tax	15	197
Excess profits taxes	—	26
2. Direct taxes on capital		
Death duties	78	184
3. Taxes on expenditure		
Customs and Excise duties:		
Beer	66	256
Wines and spirits	41	147
Tobacco	84	661
Purchase tax	—	390
Entertainments	8	40
Betting	—	28
Hydrocarbon and other oils	138	438
Motor vehicles licence duties	35	85
Broadcast licences	4	4
Stamp duties	21	75
Post office surplus	11	2
Other expenditure taxes	4	18
4. Other revenue		
National Insurance Contributions	—	594
Profits and other income from property	28	330

(those on consumers expenditure), which can.

The total P. R. in Great Britain for various years since 1880 is as follows:

	£m.
1880-1	82
1900-1	140
1913-14	198
1918-19	889
1919-20	1340
1920-21	1420
1929-30	815
1937-8	876
1938-9	931
1945-6	3284
1955	5592

Local Taxation Revenue. The total amounts received by local authorities in England and Wales from the rates were:

	£m.
1913-14	71
1935-6	165
1940-1	204
1945-6	221
1955	476

In addition to block grants under the Local Government Acts, 1929-46, local authorities receive other large gov. grants, e.g. from the Ministry of Education for purposes of education, from the Home Office for police expenditure, from the Ministry of Health for housing, etc. They also receive large sums from gov. depts as reimbursements in respect of expenditure on emergency services. Total gov. grants to local gov. authorities in 1946-7

amounted to £252,113,000 for England and Wales, and in 1944-5 to £25,874,000 for Scotland.

United States. The P. R. of the U.S.A., including receipts from taxes, customs, surplus property, etc., was \$44,718m. in 1947 and \$73,173m. in 1954.

Public School, term which has greatly varied in meaning at different times. It can be used in a wide sense to denote (as in the U.S.A.) a school which is not under private ownership and control. In England, however, the term has gained a special, narrower meaning. According to the terms of reference of the Fleming Committee (1942) P. S.s are 'schools which are in membership of the governing bodies' association or the headmasters' conference.' The election of a headmaster to the latter of these organisations normally depends on his school: (1) possessing a certain amount of independence; (2) undertaking some post-general certificate work; (3) containing a certain number of boys over the age of 13; (4) having a number of former pupils at univs. Such schools number rather fewer than 200. Slightly less than half are 'independent' schools, the rest being aided by grants from local education authorities or from the Ministry of Education. They are controlled by a board of governors or other constitutional authority. P. S.s were often founded for religious or philanthropic purposes, some of them dating back to the Middle Ages (Winchester, 1382, Eton, 1440), but the majority were founded in the 18th and 19th cents. Eton is said to have been the first grammar school to receive the name of P. S., the meaning then being that scholars might come to it from any part of England, and not, as was generally the case, from the immediate neighbourhood of the school. The exclusive P. S.s have been frequently criticised because they began as foundations for poor scholars and grew into a privilege of the wealthy. Both Eton and Winchester were enjoined in their charters to provide for free place pupils, 'pauperes et indigentes', but, like many other P. S.s, both in time estab. exclusive traditions. This exclusiveness has often been the chief difference between many a P. S. and the old grammar schools from which sev. P. S.s originated. Features common to all P. S.s are the prefect system, religious teaching, a high regard for team games, and an emphasis on character building. But these features also prevail in many grammar or other secondary schools, private or otherwise, and it is therefore often hard to define a P. S. otherwise than by reference to the important social and economic aspect. A large number of P. S.s are residential, which makes them more expensive, and although some have always been day schools, even these, on account of their social pre-eminence, have been in a position to choose their pupils carefully. But though in the past many boys went to P. S.s from recognised preparatory schools, many were able to enter by obtaining open scholarships.

since 1944, when the Education Act allowed local authorities to provide education of the P. S. type where this seemed to suit parents and pupils, many boys have gone to famous P. S.s by way of the qualifying common entrance examination taken by children at the age of 11. It may be doubted whether the traditions of the P. S.s differ substantially from those of the endowed grammar schools. Both groups had suffered a great decline by the early 19th cent., and were in need of reform. The Public Schools Act of 1868 was the outcome of a royal commission set up in 1864 to investigate the working of 9 schools—Eton, Harrow, Winchester, Shrewsbury, Charterhouse, Rugby, Westminster, St Paul's, and Merchant Taylors' (qq.v.)—but the last 2 were subsequently omitted from the operation of the Act of 1868. It appeared evident that some schools at least had instituted reforms in the standard of accommodation, curriculum, and moral tone before the commission was appointed. About this time a number of new P. S.s were founded. These include Marlborough, Cheltenham, Radley, and Lancing (qq.v.), all in the 1840's; Wellington (q.v.) in the 1850's; and Clifton (q.v.) in the 1860's. Canford, Stowe, and Bryanston (qq.v.) were estab. after the First World War. Among specifically Catholic P. S.s are Ampleforth (Benedictine), Beaumont (Jesuit), Douai, Downside (Benedictine), and Stonyhurst (Jesuit) (qq.v.). The P. S. revival had much influence on the general state of education. These largely exclusive schools heralded the beginnings of a national system of education. The headmasters' conference was estab. by Thring of Uppingham as a protest against the exclusion of the 7 schools dealt with in the Public Schools Act from the Endowed Schools Act of 1869. In 1940 an association of governing bodies of P. S.s was founded. Two years later a similar association in respect of girls' schools was formed, the schools belonging to it being generally termed P. S.s, although the term is more commonly used in connection with boys' schools. The Eng. P. S. has, since 1850, been responsible for educating a very large proportion of the leading figures in Eng. public life. Among the most famous P. S. masters are Arnold of Rugby (q.v.), James of Eton, Samuel Butler of Shrewsbury (q.v.), Thring of Uppingham (q.v.), and Henry Montagu Butler of Harrow (q.v.). The chief contribution made by Thring and others to the school world was to restore to it the ideal of the Christian gentleman. While recognising the great achievement of P. S.s in scholarship it is not unfair to assume that the development of the mind is not a primary consideration, and that the chief concern is the moulding of an upright character through the corporate life of the school, and the training of a good citizen, though critics, often from the P. S.s themselves, have complained that they encourage class isolation. This criticism, however, has lost much of its force since the beginning of

the 20th cent., and especially since 1944. See E. C. Mack, *Public Schools and British Opinion, 1780-1860*, 1938, and *Public Schools and British Opinion since 1860*, 1941; W. O. Lester-Smith, *To Whom do Schools Belong?*, 1943; Sir R. Livingstone, *Education for a World Adrift*, 1944; H.M.S.O., *Public Schools and the General Educational System*, 1944; J. F. Wolfenden, *The Public Schools To-day*, 1949; see also individual entries for boys' and girls' schools, and *The Public Schools' Year Book*.

Public Service Vehicle, defined in the Road Traffic Act, 1956, as 'a motor vehicle used for carrying passengers for hire or reward which either is carrying passengers at separate fares, or is not carrying passengers at separate fares but is adapted to carry eight or more passengers.' Trams and trolley vehicles are not included. P. S. V. operation is controlled by the Traffic Commissioners under the licensing system set up by the Road Traffic Act, 1930. Vehicles must satisfy prescribed conditions of fitness. They are divided into 'stage' and 'express' carriages carrying passengers at separate fares, which can only be run under road-service licences; and 'contract' carriages not carrying passengers at separate fares, which do not need road-service licences. Under certain conditions vehicles may carry passengers without becoming, in the case of those adapted to carry less than 8 passengers, P. S. V.s, or in the case of those adapted to carry 8 or more passengers, stage or express carriages. The London Transport Executive do not require road-service licences for services wholly within their 'special area,' but the routes, stopping places, and types of vehicle used must be approved by the Traffic Commissioner. Part V of the Act of 1930 gave a local authority who, under any local Act or order, was operating a tramway, light railway, trolley vehicle, or omnibus undertaking powers to run P. S. V.s on any road within their district, and with the consent of the Traffic Commissioners on any other road; a road-service licence is required in addition to the powers given under Part V or by special Act or order.

Public Stores. The Brit. Gov. appropriates certain marks, the most familiar of which is the broad arrow, for the purpose of distinguishing P. S. By the Public Stores Act, 1875, it is a misdemeanour punishable by imprisonment up to 2 years to put any of these marks without authority on non-gov. stores. To obliterate such marks so as to conceal the fact that stores are gov. property is a felony punishable with imprisonment up to 7 years.

Public Trustee, gov. official whose office was opened in 1908 under the Official Trustee Act, 1906, and through whom the State acts as executor and trustee under a will, or as trustee under a settlement and in other similar capacities. The value of the trusts accepted up to 31 Mar. 1957 was just under £620,791,000. The facts of any trust, new or old, in which it is

desired that the P. T. should act may be brought to his notice by letter or interview. The appointment is effected in the same way as a private trustee, or by an order of the court. The P. T. can act solely or jointly with others. Executors who have obtained probate can transfer their duties to him under an order of the court. He can also act as an administrator with or without the will annexed. Strict secrecy is observed in all matters dealt with in the dept of the P. T. Accounts in simple form are furnished to the beneficiaries as required.

Public Utilities, corporations operated in the public interest for the supply of essential services, such as water, gas, electricity, transport, etc.

GREAT BRITAIN.—*Water*, see WATER SUPPLY; METROPOLITAN WATER BOARD; PUBLIC HEALTH. *Gas*, see GAS AUTHORITY, BRITISH; GAS MANUFACTURE. *Electricity*, see CENTRAL ELECTRICITY AUTHORITY; ELECTRIC POWER TRANSMISSION; ELECTRIC SUPPLY. *Transport*, see BUSES AND COACHES; TRAMWAYS; ELECTRIC TRACTION; BRITISH TRANSPORT COMMISSION; LONDON TRANSPORT; RAILWAYS, *British*. *Postal System*, see POST OFFICE.

U.S.A.—The chief public utility owned and operated by most Amer. cities is the water supply, and vast sums have been spent to assure a supply of pure water. Both New York and Los Angeles bring water from distances, New York's supply alone being at a total cost (down to 1956) exceeding \$1,000m.

The production of electric light and power in 1956 amounted to 600,592,000,000 kWh.—458,954,000,000 by private companies and 141,638,000,000 by government and other agencies (including the Tennessee Valley Authority and Bonneville Power Administration). This can be compared with a total production of 223,178,000,000 kWh. in 1946. Installed and generating machinery of the industry totalled 161,383,000 h.p. in 1956. About four-fifths of the output was by steam plants. Some 97 per cent of U.S. families live in electrically wired houses, and of the 54,000,000 customers served by the industry in 1956 more than 47,000,000 were households. About 4,600,000 farms (95.9 per cent of the estimated total) were electrified. The average use of electricity in 1956 was 2969 kWh. per household and 4879 kWh. per farm. As many as 12 electric companies or rural electric co-operatives had atomic reactors for the production of power in the stage of construction or definite planning in 1957.

The supply of gas (now almost wholly natural gas) is also largely in the hands of private corporations. In 1956 the gas utility and pipeline industry had an average of 29,536,800 customers, who consumed 72.9 billion therms (1 therm = 100,000 B.Th.U.s). The chief source of natural gas in the U.S.A. is the SW., from which it is pumped by pipeline to all the major cities, travelling in some cases (e.g. Texas to New England) almost 1000 m. For gathering, transmitting,

and distributing gas, 523,960 m. of main were used in 1956.

Transportation, with rare exceptions, notably the 228 m. city-owned New York subway system, is provided by private companies, whose railway, omnibus, and airplane systems cover the whole country with close networks.

The postal system, as in most countries, is in the hands of the federal gov. However, telegraph, telephone, radio, and television services are provided by private companies.

Public Works Administration, see WORKS AGENCY, FEDERAL.

Public Works Loan Board, an independent statutory body consisting of 12 unpaid Commissioners appointed by the Crown. Its functions are derived chiefly from the Public Works Loan Act, 1875, and the Local Authorities Loan Act, 1945; they are to consider applications for loans by local authorities and other prescribed bodies, and, where loans are approved, to collect the repayments.

Funds provided by Acts of Parliament are drawn from the Local Loans Fund through the National Debt Commissioners. The Treasury fixes the interest rates. Loans need the approval of gov. depts and the consent of the Treasury. In 1955 the Chancellor asked the Board to inquire into the ability of loan applicants to raise funds in the open market by stocks or mortgages (he wished to limit the loans granted by the Board in the effort to disinflate the economy). This new policy necessitated a complete revision of the Board's procedure. During 1955 advances totalling £364m. were made, compared with £386m. in 1954-5. In 1956 the average rate of interest was over 5½ per cent. The loans outstanding at Mar. 1956 were £3126m.

Public Worship Regulation Act, see ECCLESIASTICAL COURTS.

Publicani, or Farmers-General, business men of anc. Rome, who bid every *lustrum* (5 years) at a public auction, held by the newly appointed censor in Rome, for the right either of collecting the taxes due to the state treasury from the lands of Italy and the prov., or of contracting for the execution of public works. Often the P. formed joint-stock companies (*societates publicanorum*). Drawn from the equestrian ranks, they rapidly acquired great political influence as the capitalistic class, their enormous wealth being amassed often by gross extortion and embezzlement; hence the derogatory 'publicans and sinners' in the N.T.

Publicity, see ADVERTISEMENT; PROPAGANDA; PUBLIC RELATIONS.

Publishers Association, the representative trade organisation of Brit. book publishers. Founded in 1896 to check (by means of the Net Book Agreement) the price-cutting then disastrously affecting booksellers, the P. A.'s prime object soon became the co-operative promotion and protection of book publishers' interests and to encourage the widest possible spread of printed books throughout the world. This object is attained by the

exchange of information among members, by the formation of groups of members with similar, specialised interests, by the provision of advisory services on a wide range of subjects, technical and otherwise, and generally by dealing with those difficulties not susceptible to solution by individual publishers. The P. A. is administered by 3 officers and a council of 12, together with 9 groups and 15 standing and other committees. There are 278 full and 83 associate members representing about 93 per cent of the U.K. book publishing turnover. H.Q. are at 19 Bedford Square, London, W.C.1.

Publishing (Lat. *publicare*, to make public property) refers specifically to the production and distribution to the public of reading matter in printed form—in particular books, periodicals, newspapers, and music. In this restricted sense P. exists in all civilised nations. (See also MAGAZINES; NEWSPAPERS; MUSIC.) Here we are concerned with books such as may be found in any general bookshop in the Brit. Is. or the U.S.A. The work of P. in this field consists of selection of MSS. and planning and commissioning of books; negotiation of agreements with authors, artists, and editors; planning and supervising the production; and copyrighting and marketing the finished product. Normally the publisher finances the manufacture and marketing of books, and remunerates the authors through regular royalty payments. School and university text-books and medical books are prepared and marketed in special ways.

In classical and medieval times the bookseller employed copyists and became the producer (or publisher) of his own stock-in-trade. Even after the introduction of printing, bookselling, printing, and P. were conjoined occupations (see BOOKSELLING; PRINTING). In England the book trade was consolidated by the incorporation of the Stationers' Company in 1557 during the reign of Queen Mary, and the charter was confirmed by Queen Elizabeth in 1559. The company was vigilant in the protection of its monopolies and became an instrument of gov. in suppressing seditious and, in the religious field, controversial literature. Towards the end of the 16th cent. the bookseller began to separate himself from the printer, and to engage authors to write. The system was strengthened by James I, and the Stationers' Company operated under the control of the Crown; for instance, the privilege of printing the Bible was vested in a group of publishers in partnership, including the King's printer, Robert Barker, who pub. the authorised version in 1611. The 'free' publishers lost the day, and finally for political reasons a Star Chamber decree of 1637 placed the book trade under strict licence and supervision. The power of the Star Chamber, however, gradually declined, and in 1643 Parliament, becoming nervous of the freedom enjoyed by the publishers, issued an ordinance which invoked a censorship similar to that under the Star Chamber. It was against

this ordinance that Milton wrote—and pub. without licence—his *Areopagitica* in 1644. Fifty years later his hopes were realised, and the licensing of the press was abolished (see also PRESS, FREEDOM OF THE).

The Copyright (q.v.) Act was passed in 1709 and led to the replacement of patronage by subscription. Tomson (q.v.) the elder was flourishing at that time and became the publisher of Addison and Steele and of Pope's *Pastorals*. Wm Taylor's successful business in Paternoster Row was taken over in 1724 by Thomas Longman (q.v.), who had a share in the pub. of Johnson's *Dictionary*. He and his son, also Thomas Longman, John Murray (q.v.), and Robert Dodsley (q.v.) were all associated with Samuel Johnson's work.

By the beginning of the 19th cent. P. had come to be a profession in its own right as distinct from bookselling. The increasing market for books of all kinds presented the trade with many problems resulting from free and uncontrolled competition, and the Booksellers' Association (q.v.) endeavoured to prevent books from being sold below their pub. price. The Booksellers' Association failed in this purpose. The original Net Book Agreement was negotiated in 1899 by the Publishers Association founded in 1896, Sir Frederick Macmillan being president at the time of the agreement. It was really not an agreement but a statement by publishers, as individuals, of the terms upon which they would supply booksellers as individuals, and it was successful in lifting the bookselling trade out of the hopeless state to which it had been reduced as a result of price-cutting. It provided that no book published at a 'net' price might be sold for less than that price, and retailers were required to accept this condition before they obtained supplies. The system has been accepted without question throughout the trade, and when a breach has occurred it has usually been inconsiderable and corrected without trouble; but because observance of its terms was enforceable by publishers' collective action the Net Book Agreement fell within the ambit of the Restrictive Trade Practices Act, 1956. It has therefore had to be abandoned in favour of a revised plan designed by the Publishers Association to co-ordinate (as far as the Act allows) such steps as individual publishers may have to take in support of their legal right to maintain their net book prices.

P. in America scarcely existed in colonial days, and the P. of American authors was retarded long past the days of Washington Irving and James Fenimore Cooper by a copyright situation that permitted easy piracy of popular Brit. authors such as Scott and Dickens; but several American firms that are still in active existence had their beginnings between 1790 and 1850. In the U.S.A. the remarkable growth of both membership libraries (Boston Athenaeum, New York Society Library, Library Company

of Philadelphia, etc.) and public libraries went far to strengthen the P. industry. Among the great donors in the public-library field after 1900 was Andrew Carnegie (q.v.). Rental libraries also have played a part.

A new international copyright (q.v.) convention promoted by U.N.E.S.C.O. (q.v.) and ratified by the Brit. Gov. in 1957 has done much to regularise the copyright situation. International co-operation is also the purpose of the International Publishers' Association, which meets at intervals in European cities.

Some noteworthy ventures in Brit. and Amer. publishing have been the *Ency. Brit.* (first published at Edinburgh 1768-71, and now under the sponsorship of the University of Chicago), the *Dictionary of National Biography* (founded in 1882 by George Smith of Smith & Elder, and now issued by the Oxford Univ. Press), the *Dictionary of American Biography*, and cheap but attractive series of standard classics of Eng., Amer., and world literature—among them Everyman's Library (q.v.), the World's Classics (q.v.), the Temple Classics, the Loeb Classical Library, and the Modern Library.

During the First World War the P. trade had to face many of the problems which confronted it in a worse form 25 years later: chief among them was the destruction of stocks by air attack and the shortage of paper. Thanks to the National Book League (q.v.) and other movements, P. was better organised in 1939 than in 1914 to meet the difficulties of world war, and one of the most notable effects of this was the exemption of books from purchase tax by the Brit. Gov., as a result of representations from all sections of the trade. War-time restrictions were not completely relaxed until 1949, when there was a return to normal paper supply. Since then both costs and prices have increased, and the value of the post-war trade in the U.K. rose to £50m. in 1955 as against £10m. in 1939.

Both in Great Britain and in the U.S.A., 2 extraordinary developments of recent years have been the book clubs (q.v.) and cheap editions in paper covers (Fr. *broche*). The book clubs are business enterprises owned by shareholders and pay dividends to the degree that they are successful. They have boards of editors who elect every month, from among the new or recent books of ordinary publishers, one or more titles calculated to appeal to many readers, and either contract with the publisher concerned to buy enough copies at a special rate for their own subscribers or, under a similar contract, arrange to print from duplicate plates the copies to fulfil their subscription needs. The earliest such clubs in England were the *Left Book Club* (political, 1936) and *Readers Union* (literary, 1937); the best known in the U.S.A. are the *Book-of-the-Month Club* (1926) and the *Literary Guild of America* (1927), with memberships high in the hundreds of thousands. Publication in paper covers (paper-backs)

has long been the usual form in France. In Great Britain and the U.S.A., cloth or board covers have been usual; but there have been attempts from time to time to popularise lower-priced books in paper covers. Not until 1935, when Allen (now Sir Allen) Lane launched Penguin Books (q.v.), did this style attain popularity, with the help of a demand from the services for expendable books. The number of paper-backs issued by all Brit. publishers is estimated in hundreds of millions (1958). An even larger expansion began in the U.S.A. in 1939 with the founding of Pocket Books, Inc., which printed 10,000,000 copies of its books in 1941, 20,000,000 in 1942. In later years many regular publishers began to issue paper-back series, the total numbers being of the order of 1,000,000,000.

With the advance of the 20th cent. sev. well-known P. firms have disappeared from the Brit. scene, and many other relatively small but distinguished houses have been affiliated to groups under united financial control. In the U.S.A. there has been a similar tendency towards affiliation; there has also been a large development of univ. presses, which have spread to all parts of the country. Contemporary lists of the Brit. and Commonwealth firms and their specialised activities are to be found in the *Writers' and Artists' Year Book* (annual), and of the Amer. firms in the *Literary Market Place* (annual). See BOOKBINDING; BOOK CLUBS; BOOKSELLING; COPYRIGHT; LIBRARIES; LITERARY CENSORSHIP; PAPER; PRINTING; and the biographies of the founders of the old-estab. firms. See also Stanley Unwin, *The Truth about Publishing*, 6th ed. 1950, Amer. ed., with notes by F. Greenslet, 1927; O. H. Cheney, *Economic Survey of the Book Industry* (Amer.), 1932; F. A. Mumby, *Publishing and Bookselling*, 4th ed. 1956; J. Hampden (ed.), *The Book World*, 1957; C. B. Grannis (ed.), *What Happens in Book Publishing*, 1957.

Puccini, Giacomo (1858-1924), It. operatic composer, b. Lucca, of a musical family. He studied under Bazzini, and later under Ponchielli, at Milan. Ponchielli persuaded him to take part in a competition for a one-act opera advertised by the publisher Sonzogno, and he wrote *Le Villi* (1883); but the prize was won by Mascagni's *Cavalleria Rusticana*. *Le Villi* was, however, produced at Milan in 1884, and drew Ricordi's attention to P. He commissioned P. to write another opera, *Edgar*. This failed, but P. had his first great success with *Manon Lescaut* at Turin in 1893. Three years later he wrote his most popular work, *La Bohème*, and soon accumulated a large fortune from his music. He was the predominating figure in It. music in his time; and his operas, which combine to some extent the sensuous melody of Rossini and Verdi with the richness of modern 'impressionist' harmony, are exceedingly popular. His other works include *Tosca*, 1900; *Madama Butterfly*, 1904; *The Girl of the Golden West*, 1910; *La rondine*, 1917; *Tristano*

(*Il tabarro*, *Suor Angelica & Gianni Schicchi*), 1918; and *Turandot* (unfinished, completed by Franco Alfano, prod. 1926). P. d. at Brussels after an operation for cancer of the throat. See lives by R. Specht, 1933, G. R. Marek, 1942, and V. Seligman, *Puccini Among Friends*, 1938.

Pucelle, La, see JOAN OF ARC.

Puck, otherwise Robin Goodfellow,

is also utilised by Drayton, Burton, and Ben Jonson.

kingdom of Elmet, which retained its independence for more than 200 years after other more petty kingdoms had been subdued by the Saxons. The bor., incorporated in 1899 and enlarged in 1937, includes Fulneck, a Moravian settlement since 1745, and Farsley and Calberley. The cricketers John Tunncliffe, Herbert Sutcliffe, and Sir Leonard Hutton were born in P. Pop. 30,660.

Puebla: 1. State of Central Mexico on the high volcanic S. Plateau of Anáhuac. Cap. Puebla. It has a healthy climate and fertile soil. It is drained principally by the R.s Salado and Atoyac. Cotton,



PUEBLO AT TAOS, NEW MEXICO

E.N.A.

Puddingstone, a term applied to some conglomerates (q.v.) with very well-rounded pebbles.

Puddling, see IRON AND STEEL.

Pudens (fl. c. AD 60), Rom. senator, baptised by the apostles. By many he is identified with the P. mentioned by St Paul (2 Tim. iv. 21). He was the father of St Praxedis and St Pudentiana and it is probably on the site of his house that the first Rom. basilica of Santa Pudenziana was built. See A. Petagnani, *La Basilica di Santa Pudenziana*, 1934.

Pudsey, municipal bor. of the W. Riding of Yorks, England, 4 m. E. of Bradford and 5 m. W. of Leeds. It has an important woollen and worsted trade, and possesses dyeing and fulling mills. Machinery is made, and iron and brass founding carried on. The name P. occurs in Domesday Book, but in the early 6th cent. P. and the neighbourhood appear to have been the centre of the considerable

coffee, sugar, etc., are grown, and cattle are reared. There are unexploited mineral resources. Area 13,126 sq. m. Pop. 1,625,830.

2. City of Mexico, cap. of the state of P. on the R. Atoyac, 65 m. ESE. of Mexico city. Alt. 7200 ft. P. ranks as the fourth largest city in Mexico. The Aztec civilisation reached great heights in this region, and the marvellous Pyramid of Chohula 7 m. to the W. is still visited. This old Sp. city, founded in 1532, has broad streets, many fine Sp. colonial churches, an old university, and a Doric cathedral, begun in the middle of the 16th cent. There are many houses of the colonial period, with grilled windows and balconies, and façades decorated with patterned and highly coloured tiles. The Teatro Principal, built in 1790, claims to be the oldest existing theatre on the Continent. P. is a busy manufacturing city, and produces cotton and woollen goods

leather goods, soap, glass, tiles, pottery, tobacco, and boots and shoes. Iron-founding and distilling are carried on. Coal is mined in the vicinity and marble is quarried. Pop. 211,203.

Pueblo, city and co. seat of P. co., Colorado, U.S.A., 100 m. SSE. of Denver. It is the second largest city of Colorado, and an important shipping, trade, and industrial centre; it is one of the greatest smelting centres in the U.S.A., and also manufs. steel rails, wire, nails, pipes, cables, cast-iron fittings, flour, dairy products, bricks, tiles, brooms, tents, awnings, and leather goods. It has a junior college and state hospital for the insane. It is the H.Q. for San Isabel National Forest. Pop. 90,188.

Pueblo, term meaning a tn or vil. in Spain or Sp. America, more especially a communal vil. or settlement of Indians. In U.S. archaeology P. is applied to a tribal dwelling of the aborigines of New Mexico, etc.

Pueblos, name given to those Amer. Indian tribes occupying the Pueblo (q.v.) area of Arizona and New Mexico, so called because of the Pueblo architecture of rock dwellings, cliff houses, and stone houses in the open country; with them is found remarkable black-on-white decorated pottery. The culture seems to have originated in the Rio Grande valley. Most other Amer. Indian tribes lived in more fragile non-stone shelters. The P. tribes belong to sev. linguistic stocks, but share similar cultures, of which a common feature is the Snake Dance. The best known are the Hopi (q.v.) and the Zuni (q.v.), but there are some 25 in all. See A. V. Kidder, *Introduction to the Study of Southwestern Archaeology*, 1924; E. L. Hewett, *Ancient Life in the American Southwest*, 1930.

Pueloche, tribe of Indians, inhabiting Central Argentina. They were an offshoot of the Araucanians of Chile, and intermarried with the Patagonians and Pampas Indians. They migrated beyond the Negro R. The P. are nomadic in character, but their name is commemorated as that of a S. district of La Pampa prov., Argentina.

Puente Caldeas, Sp. tn in the prov. of Pontevedra, with tin mines and sulphurous springs. Pop. 10,000.

Puente Genil, Sp. tn in the prov. of Córdoba, on the Genil. It produces linen goods and olive oil. Pop. 20,300.

Puenteareas, Sp. tn in the prov. of Pontevedra, on the Tea, in a vine-growing dist. It manufs. porcelain. Pop. 13,900.

Puerperal Fever, or Child-bed Fever, see OBSTETRICS.

Puerperal Insanity. There is no special form of insanity peculiar to the reproductive period in the female, and the psychoses which do occur then do not differ materially from similar reactions in other periods of life. They belong to the infection-exhaustion group, and while they may exemplify organic-reaction types, there is an increasing tendency to believe that the infective exhaustive state serves as a precipitant of a latent reaction

type of another kind (e.g. mania-depressive psychosis and schizophrenia) more frequently than was formerly believed. In such cases investigation has revealed a psychopathic make-up, either with a definite hist. of hereditary predisposition or of individual instability due either to constitutional or environmental factors. It has been shown that in the absence of other predisposing and precipitating factors, the existence of sepsis during the puerperium plays a relatively unimportant part, *per se*, in the causation of a psychotic breakdown. Knowledge that the child is illegitimate (especially where this is likely to involve serious social consequences), desertion by or death of the father, fear of childbirth, a neurotic attitude towards motherhood (preconditioned by relationships and conditions in the parental home), and a maladjusted married life are all considered important predisposing factors. The importance of the effect upon the mother of the father's attitude towards the pregnancy and birth has also been stressed.

The puerperal psychoses are usually divided into 3 groups: (1) insanity of pregnancy, (2) P. I. proper, which includes all cases occurring within 6 weeks of labour, and (3) lactational insanity. The mental disorder of pregnancy is usually melancholia, and its most important aspect is the danger of suicide. This is greatest when the delusions are self-accusatory in type, but they also frequently lead to an intense dislike of and unfounded accusations against the husband. Hallucinations may develop. The prognosis is very good in cases occurring before the fourth month. In psychoses which first appear after this, the prognosis still remains favourable, but the condition frequently does not clear up until after the baby is born. When a breakdown occurs at the time of delivery or in the first 2 weeks of the puerperium, the psychosis usually takes the form of mania. The attack is commonly acute, food may be refused, and transitory delusions and hallucinations, both visual and auditory, may be present. Remissions followed by a recurrence of the confused excitement are not uncommon. In the later stages of the puerperium the disorder is usually depressive in character, with delusions of unworthiness, suicidal tendencies, and possible attempts at infanticide. The psychoses occurring during the period of lactation are usually melancholias of sub-acute type, with self-accusatory delusions and suicidal and infanticidal tendencies. With regard to the prognosis in psychoses occurring after delivery, it may be said, generally speaking, that the sooner they occur after the birth of the child the better the outlook. Those which first appear late in the lactational period tend to run a long course. See also INSANITY and PSYCHOPATHOLOGY. See Sir M. and T. Beaton, *Psychological Medicine*, 1926; R. G. Gordon, *An Introduction to Psychological Medicine*, 1936; D. K. Henderson and R. D. Gillespie, *A Text-book of Psychiatry* (7th ed.), 1950.

Puerto Aneón, see ANCON.

Puerto Barrios, cap. of Izabal dept. on the Gulf of Amatique, on the Atlantic coast of Guatemala. It lies about 200 m. from the cap. (10 hrs. by rail) and is the terminus of the International Railways of Central America. Most of the import trade of Guatemala goes through this port. Pop. 15,332.

Puerto Bello, see PORTO BELLO.

Puerto Cabello, or Porto Cabello, port with an excellent harbour in Venezuela, situated to the NW. of Valencia. After La Guaira it is the chief port of the state, and exports coffee, cocoa, sugar, hides, and skins. It is connected by rail with Valencia and Caracas; both railroads were built with Brit. capital. During the S. Amer. War of Independence it was surprised and taken by patriots under Páez, 1823. There are shipbuilding and dry-dock facilities, corn and cotton mills, saw mills, and beef-packing plants, as well as cigarette factories. P. C. also has considerable trade in woods, corn, and gold. Nearby is the beach-resort of Playa Ganago. Pop. 34,400.

Puerto Cortés, formerly Caballos, largest port of Honduras, Central America, on the Atlantic coast. It is 207 m. from Tegucigalpa, and stands at the mouth of the Ulúa R. The exports include bananas, hides, coffee, gold, rubber, and mahogany. Pop. 8,000.

Puerto de Calbariën, see CAIBARIÉN.

Puerto de Santa Maria, Sp. seaport in the prov. of Cádiz, on the Atlantic, at the mouth of the Guadalete. It has a Moorish castle and a Baroque church, and has a large commerce in sherry. Pop. 29,200.

Puerto Madryn, small port of Argentina in the ter. of Chubut, on the Golfo Nuevo. It was founded by the Welsh colonist, Parry Madryn, in 1685. It is the N. terminal of the Belgrano railway to Trelew and Rawson. It has sheep rearing, meat canning, and fisheries. Pop. 3,300.

Puerto México, see COATZACOALCOS.

Puerto Montt, tn of Chile, cap. of Llanquihue prov., 670 m. S. of Santiago and 80 m. from Osorno (q.v.). It stands on a magnificent bay, and is the terminus of the S. railway, and point of embarkation for Chiloé and Punta Arenas. The port is much used by coasting steamers and serves a sheep-farming dist. Leather, wheat, and timber are exported. Pop. 18,700.

Puerto Plata, port of Dominican Republic, on the N. coast of the is. It is a cable station connected with St. Thomas, Leeward Is. Cotton, coffee, bananas, and tobacco are exported. P. P. is of great commercial importance. Pop. 14,420.

Puerto Principe, see CAMAGÜEY.

Puerto Real (Rom. Portus Gadetanus), Sp. tn in the prov. of Cádiz, on the Bay of Cádiz. It has a good beach and is a popular holiday resort. There is a trade in wine and oil, and some boatbuilding. Pop. 15,000.

Puerto Rico, formerly called Porto Rico, is. of the W. Indies, one of the Greater Antilles, 60 m. E. of San Domingo. P. R. is a possession of the U.S.A.

It is about 100 m. long, with an average width of 39 m., and has an area of 3,435 sq. m. A mt range traverses the is. from E. to W. The highest mt is Cerro de Punta (4,400 ft). From the mts the ground slopes gradually to the sea on the N. and W., and more abruptly on the S. and E. The mt slopes facing N. are deeply intersected by the many streams, which have formed narrow valleys and sharp ridges. The N. and E. slopes have a heavy rainfall, the S. and W. being drier; e.g. the rainfall of San Juan is 60 in., of Ponce on the SW. coast 36 in., but both places enjoy the 'temperate' tropical climate of is. influenced by trade winds. The higher slopes are forested, and supply valuable timber, incl. sandalwood and ebony. Agric. is the chief industry, and rum is manufactured. The fertile soil produces sugar, coffee, tobacco, oranges, pine-apples, and other tropical fruits, corn, rice, cacao, vanilla, coconuts, sea-is. cotton, and vegetables. 1,325,000 short tons of sugar were produced in 1951. Bat guano and phosphates are abundant. The fisheries are also profitable. Other industries include cigar- and cigarette-making and the manuf. of hats and embroideries. Minerals include some gold, magnetic iron, manganese, galena, gypsum, kaolin, coal, lime, marble, and granite, and there are extensive salt-works. A gov. agency, the Industrial Development Co., has assisted in the estab. of factories for the production of textiles, glass, shoes, cement, etc. From May 1948 certain estab. industries and new concerns were granted 12 years' exemption from certain taxes, incl. income tax. Industrialisation has advanced as the result of hydro-electric projects such as Carite, Rio Blanco, Toro Negro, Garzas, and Dos Bocas. San Juan, on the N. coast, is the cap. and chief port; other tns include Ponce, which has also a good harbour, Mayagüez, and Arecibo. There are over 2,000 m. of good roads and nearly 400 m. of railways. The is. is subject to hurricanes, one in 1928 causing great damage. Rio Pedras is the seat of the Univ. of P. R.; the School of Tropical Medicine is at San Juan; and San Germán has a polytechnic institute.

P. R. was discovered by Columbus in 1493, and in 1508 was explored by Ponce de León (q.v.). It remained a Sp. dependency until it was ceded to the U.S.A. in 1898 by treaty after the Sp.-Amer. War. The constitution of P. R., as estab. by the 'Jones Act' of 1917, was amended in 1947. There is representative gov. The governor, who since 1948 is elected by popular vote every 4 years, is the executive power; his executive council comprises 7 heads of depts. There is a bicameral legislature. The amendment of 1947 also provided that all heads of the depts of the Insular Gov. be appointed by the governor; the auditor of P. R. and the justices of the supreme court continued to be appointed by the President of the U.S.A. English is the official language, but Spanish is the native tongue. Pop. 2,210,703 (about 750,000

of this total are bilingual). See T. White, *Puerto Rico and its People*, 1938; B. Pagan, *Puerto Rico: The Next State*, 1942; E. S. Garber and E. B. Fincher, *Puerto Rico: Unsolved Problem*, 1945; R. Tugwell, *The Stricken Land*, 1947; also *Puerto Rico Monthly Statistical Reports*, beginning 1943.

Puerto Varas, tn of Chile, in the prov. of Valdivia, on the edge of Lake Llanquihue, and near the Osorno, Calbuco, and Tronador volcanoes. It is in the Chilean 'Switzerland,' 16 m. from Puerto Montt (q.v.) and 650 m. from Santiago on the S. railway line. P. V. is a noted beauty spot. Pop. 4150.

Puertollano, Sp. tn in the prov. of Ciudad Real. It is a busy manufacturing tn, and the centre of a rich coal-mining dist. Pop. 31,000.

Puff-adder, or *Bitis arietans*, ophidian reptile in the family Viperidae, and subfamily Viperinae. It is a native of Africa and S. Arabia, and is regarded with dread on account of its very poisonous nature. It attains a length of 5 ft., is yellowish-brown in colour, has a depressed head and small eyes. It is nocturnal and carnivorous, and when surprised hisses loudly; hence its name.

Puff-ball, common name given to the fruit-body of fungi of the order Lycoperdales. See BOVISTA; CALVATIA; and LYCOPERDON.

Puff-birds, or *Bucconidae*, family of piciform birds. When in repose the birds puff out their plumage, which is dark in colour with patches of white.

Puffin, bird of the family of Alcidae or Auks, sub-order Alcae order, Charadriiformes. The body is compact and the plumage close; the head is large, with a stout bill, with which the P. catches fish. The Common P. (*Fratercula arctica*) is found on the Brit. coasts, and lays its eggs in any crevice of the rocks or in a burrow which it makes. The complete range is in the N. Atlantic and adjacent arctic areas. It is a little larger than a pigeon, and lays only a single egg at a time. The tufted P. (*Lunda currata*) is another important member of the family. See also under AUK.

Puffin Island, otherwise Priestholm or Ynys Seiriol, lies off the N.E. coast of Anglesey. It is $\frac{1}{2}$ m. long, and is noted as the home of puffins. In the 6th cent. Seiriol, a hermit, had a cell on the is.

Pug-dog (etymology uncertain; possibly from Lat. *pugnus*, fist, or a weakened form of puck—M.E. *pouke*, goblin), smallest dog of the mastiff family, probably introduced into England from Holland. It became very popular in England during the reign of William of Orange, when it was known as 'Dutch P.' Its popularity died out for a time, but was revived about 1885. It can do with less outdoor exercise than any other variety of dog, but has a greater tendency to put on fat. It is amiable, but indolent. Points: body short, square, and cobby; wide chest; ribs deep and well rounded; legs strong, straight, and well under, of moderate length; feet firm, with well-

split-up toes, and nails black; head large, massive, round; muzzle short, blunt, and square; eyes large, dark, lustrous, and set well apart; mask and ears black, and head heavily wrinkled; markings clearly defined; thumbmark on forehead, and back-trace very black; tail curled slightly over the hip; coat soft, smooth, short, and glossy; colour, apricot or silver-fawn. There is also a black variety.



PUG

T. Fall

Pugachëv, Yemel'yan Ivanovich (1726-1775), Cossack leader of a popular rebellion in Russia under Catherine II. He proclaimed himself Emperor Peter III (q.v.) in 1773 and issued a 'manifesto' promising liberation of the serfs. Many Cossacks, peasants, and nomadic Bashkirs and Kazakhs took part in the rebellion, which spread over the Volga area and the Urals. After its suppression P. was quartered.

Puget Sound, inlet of the Pacific Ocean, in Washington, U.S.A., extending from the E. end of the strait of Juan de Fuca in a direct line for about 100 m. S. to Olympia. It has an area of about 2000 sq. m. and a number of is., Whidbey, Vashon, and Bainbridge being the largest. The 2 main branches are Admiralty Inlet and Hood Canal. It has a gov. navy yard. The shores are well wooded, and fir is shipped to foreign ports for use in ship-building. The sound serves a rich industrial and agric. area.

Pugilism, see BOXING.

Pugin, Augustus Welby Northmore (1812-52), architect, son of a French émigré draughtsman, b. London and educ. at Christ's Hospital. He was the pioneer of the revival of Gothic architecture in the 19th cent. While a mere boy, he designed some of the furniture of

Windsor Castle, 1827; but he subsequently undertook all sorts of commissions (especially eccles.), and in 1838-43 was employed by Sir Charles Barry in providing the detailed drawings for the Houses of Parliament. P. became a Rom. Catholic, and designed many Rom. Catholic churches, including the cathedral of St George at Southwark (severely damaged during the Second World War). He pub. *Contrasts: or a Parallel between the Architecture of the 15th and 19th Centuries* in 1836 and *The Principles of Christian Architecture* in 1841. In these books P. set out his idea of the close connection between Christianity and Gothic architecture, and attacked what he held to be the 'pagan' method of architecture of his immediate predecessors and some of his contemporaries. See biographies by H. Ferrey, 1861, and M. Trappes-Lomax, 1932.

Puglie, see APULIA.

Pulsne Judge (Fr. *puls* and *né*; Lat. *post natus*, after born). The judges of the sev. divs. of the high court of justice, other than the lord chief justice of England and the president of the divorce court, are somewhat inappropriately termed P. J.s to denote their inferiority in rank to the above-mentioned chief judges and the judges of the court of appeal and the House of Lords.

Pukapuka, or Danger, Islands, group of 3 is. in the N. Cook Group.

Puket, port on the E. side of Salang (or Junkseylon) is., on the W. of the Malay Peninsula. Its importance is due to its tin-mines. Pop. about 50,000.

Pula (It. *Pola*; Rom. *Pietas Julia*), seaport in Croatia, Yugoslavia, in the S. of the peninsula of Istria (q.v.). It is said to have been founded by the Thracians, was destroyed by Julius Caesar, and was rebuilt by Augustus at the request of his daughter Julia—for which reason it was called *Pietas Julia*. In the 14th cent. it was sacked by the Venetians. It was given to Austria by the Congress of Vienna (q.v.) in 1815, and developed into the chief Austrian naval base. By the treaty of St Germain-en-Laye (q.v.) in 1919 it went to Italy, and by the It. Peace Treaty of 1947 it was given to Yugoslavia. The tn has remarkable Rom. remains, including an arena, c. 150 yds in diameter, a temple, and sev. gates. The harbour is very large and deep, there is a busy trade, and there are shipbuilding yards. Pop. 21,000.

Pulcinella, see PUNCHINELLO.

Pulex, see FLEAS.

Pulitzer, Joseph (1847-1911), Amer. newspaper owner. b. Mako, a small Hungarian vil. His father was Jewish, his mother Austrian. He was educated in Budapest. Rejected by the Austrian Army and the Fr. Foreign Legion, he made his way to the U.S.A., where he served in the Civil war. Later he studied law, but did not practise, securing instead a position as reporter on the Ger. paper *Die Westliche Post*. He took a part in the revolt of the Liberal Republicans against the corruption in their party. Having

sold his interest in *Die Westliche Post* at a good profit, he went on a visit to Europe. Then, returning to St Louis, he bought the *St Louis Despatch*. He and the owner of the *Post* agreed to a merger, and the *Post-Despatch* became one of the leading papers of the city. By 1880 P. had become its sole owner. In 1883 he bought the New York *World* (q.v.), and by 1887 also started evening and Sunday eds. Near Brooklyn Bridge he erected to house his papers one of the first tall office buildings in New York City. P. brought to New York a different journalism from any it had known up to that time. It revelled in the sensational, but also made slashing attacks on the forces of corruption in business and politics. Among P.'s gifts was the endowment of the school of journalism at Columbia Univ. and a fund for the gift of ann. cash prizes for the best newspaper work, drama, and literature in the U.S.A. each year. See D. C. Seitz, *J. Pulitzer*, 1924.

Pulke, see PULQUE.

Pullet, see POULTRY.

Pulley, see BELTS and ROPES.

Pullman, George Mortimer (1831-97), Amer. inventor, b. Chautauqua co., New York. He invented the Pullman sleeping-car. He built his first car in 1859, and in 1863 the 'Pioneer,' at a cost of \$18,000, the first of the cars to bear his name. He organised the Pullman Palace Car Company, of which he was president, and in 1887 originated the vestibule train. He also founded a model tn called Pullman near Chicago, which is now absorbed in that city.

Pullman, city of Whitman co., Washington, U.S.A., a commercial and shipping centre for a grain, livestock, and poultry-producing region. The state college for science and agriculture is at P. Pop. 12,022.

Pulmonata, see GASTROPODA.

Pulo Penang, see PENANG.

Pulp (paper-making), see PAPER.

Pulpit (Lat. *pulpitum*, a raised platform or stage from which actors recited), in Christian churches, a raised structure, approached by steps, from which a sermon is preached; usually placed at one side of the nave. In England, P.s are first mentioned in 12th-cent. records. The earliest known example in a parish church is dated 1330; there are monastic examples in the refectories at Beaulieu Abbey and Chester Cathedral. Even up to the 15th cent., not more than 1 parish church in 4 had a P.

It was ordained in 1603 that every parish-church must have a P., and there are many fine Jacobean examples surviving, though unfortunately many others were replaced by Victorian substitutes (see GOTHIC REVIVAL). In Wren's City churches the P. was a prominent feature, and was often provided with a 'tester' or sounding-board. (For pulpits in mosques see MINBAR.)

Pulpitum. Although this Lat. word also means 'pulpit' (q.v.), in a large monastic or cathedral church (e.g. York Minster, St. Albans Cathedral), it is

applied to a massive stone gallery or rood-screen (q.v.) separating the nave from the ritual choir.

Pulque, or **Pulke**, one of the national intoxicating drinks of the Mexicans, which has never been supplanted since the time of the Aztecs. It is produced by procuring the fermented juice of the *maguey*, the *Agave americana*. See AGAVE.

Pulse, periodic change in the shape of an artery due to changes in blood pressure caused by the beating of the heart. When the blood is expelled from the heart at each systole the elastic walls of the aorta are suddenly distended and this distension is communicated to the other arteries, the movement becoming feeble and feebler as it travels away from the heart. Where an artery approaches very near the surface, the intermittent distension of its walls can be perceived visually, or if it can be compressed against a hard structure the throbbing can be discerned by touch. It is customary to gauge the action of the heart by feeling the throbbing of the radial artery at the wrist, as it can be conveniently compressed against the bone. The P. beat does not take place at the same time as the heart beat, as the wave of distension and relaxation has to travel from the heart to the wrist, but the general character of the beat is maintained. The distension occurs when the blood is being forced into the arteries; the relaxation occurs as the blood flows out of the arteries into the capillaries. There are also subsidiary beats, of which the most important is caused by the dicrotic wave, indicating the back-flow of the blood towards the heart as the outflow ceases. The normal pulse is regular in rate and volume. The frequency of P. beat varies with age, sex, and other conditions. In a new-born babe the rate is 130 to 140 times per min.; in an adult man about 72 per min.; in an adult woman 80 per min. The rate is lower when the subject is sitting, and lower still when lying down. Food, exertion, excitement, and stimulants increase the rate. Certain abnormalities of the rhythm and rate of the pulse indicate cardiac disorders, but their interpretation is a matter for a practised observer.

Pulse, term for leguminous agric. plants, particularly beans, lentils, and peas.

Pulseometer, see PUMP.

Pulteney, William, Earl of Bath (1684-1764), statesman, b. London and educ. at Westminster School and Christ Church, Oxford. He entered Parliament in the Whig interest in 1705, and was secretary of war from 1714 to 1717. He supported Bolingbroke in 1725, and assisted in forming 'the Patriots,' a party whose object it was to harass the gov. With his allies he eventually succeeded in undermining Walpole's power, and was invited, but declined, to form an administration in 1743, in which year he was created Earl of Bath. He was an able, and at times a vitriolic, speaker, but not a sound statesman.

Pultowa, see POLTAVA.

Pultusk, tn of Poland, in Warsaw prov., on the Narew, 33 m. N. of Warsaw (q.v.). It was the scene of a defeat of the Russians by the French in 1806. Its castle was formerly the residence of the Bishops of Plock (q.v.). Pop. 16,000.

Pulverised Coal. The object of P. C. is to make a solid fuel as nearly gaseous as possible, gas being regarded as the most perfect fuel state at present known. P. C. is sufficiently fine when 85-95 per cent passes through 200 mesh. This mixture in the presence of adequate air ensures complete combustion. The coal is pulverised by abrasion or chopping machines, crushing rolls, or ball mills. Since P. C. may form an explosive mixture, for safety purposes the quantity of air conveying the fuel to the burners is kept under 30 per cent of the amount necessary for complete combustion. The remaining 70 per cent is introduced at the burner. There are 3 methods of handling P. C.: (1) the unit system, where it is taken direct from the pulveriser by fan to the burner, (2) the bin-storage system, where it is stored in a bin with feeders delivering any required quantity to the burners, (3) the ring-main system, where it circulates through a main pipe provided with a number of valves, each capable of tapping off a supply for use in various furnaces. With P. C. firing, an increased load can be obtained quickly at a reasonable efficiency and without undue generation of smoke. P. C. is used in metallurgical furnaces, cement-making kilns, and for firing high-pressure water-tube boilers. Until recent years P. C. was considered to have many disadvantages, such as the danger of explosion, slagging, and grit emission from the chimney. All these difficulties have now been overcome in the modern P. C. plant.

Puma (*Puma concolor*), large Amer. carnivore, belonging to the cat family. Unlike its relation, the jaguar, it shows no trace of the feline markings when adult, the upper parts being a uniform yellowish-red, the under surface being a lighter colour. It was this uniformity of colour which led to its being mistaken for a member of the lion family, and the popular name of 'mt lion' still survives among the Rockies. P. is its Peruvian name, and from the Brazilian comes its other popular name of cougar. The name of panther was given to it by the early settlers. The average length of the body from snout to root of tail is about 3 ft 6 in., while the tail, which is about the same thickness throughout, measures somewhat over 2 ft. The P. is timid in the presence of men and shows great reluctance to attack them; it is rather inclined to try to make friends. It feeds on deer, sheep, horses, and other animals, and proves very destructive on account of its killing far more than it can eat.

Pumice, light kind of acid or silica-rich lava (q.v.), made spongy or porous by the escape of steam or gas during the process of cooling. It is used for smoothing or polishing, or for removing stains.

Pump, machine for lifting fluids, or transferring them from one place to another. The work done by a P. is measured by the weight of fluid lifted and the total head in ft (see Fig. 1). The total head includes suction head, delivery head, and losses due to the friction of the fluid in the pipes, bends, and valves calculated in ft head. The suction head is due to the air pressure on the surface of the fluid and would raise a column of water 34 ft in a complete vacuum. Owing to leaks and pipe friction it is only practical to attain a suction head of 25 ft. The recommended suction head is 20 ft for reciprocating P.s and 15 ft for centrifugal P.s. For hot fluids such as petrol there should be no suction head, and the P. should be below the level of the fluid, as the vacuum would otherwise cause the fluid to vaporise. Any reduction in air pressure at high altitude would also mean a corresponding reduction in the possible suction head. Delivery head is limited only by the design of the P. and the power available to drive it. Frictional head, caused by friction in pipes and bends, can be reduced by increasing the size of the pipes, which reduces the velocity of the fluid in the pipe. A normal pipe-line is designed to give a loss of 5 ft head per 100 ft of pipe.

The prin. types of P.s are: (1) reciprocating P.s; (2) rotary P.s; (3) centrifugal P.s. Other means of raising fluids include the hydraulic ram, air-lift P.s, Archimedes' screw (q.v.), chain P.s, etc.

RECIPROCATING PUMPS. The simplest form of reciprocating P. is the suction P. as illustrated in Fig. 2. The barrel is fitted with a piston worked by a handle pivoted in the P. casing. Valves are provided at A in the piston and at B at the lower end of the barrel, both opening in an upward direction. On the upward stroke of the piston the valve A remains closed and the air in the chamber between the valves becomes attenuated and is therefore at reduced pressure. The atmosphere pressing on the water in which the P. is sunk thus forces the water and air up through valve B into the chamber. On the downstroke of the piston valve B is immediately closed and the compression causes any air in the chamber to escape through valve A. By repeated strokes of the piston all air is thus exhausted and water is forced up to fill the chamber and escape above A with every downstroke, each upstroke lifting this on the closed valve A into the upper part of the P. barrel to flow from the spout.

Diaphragm Pump (Fig. 3). This is used for draining building foundations and works on the same principle, but is fitted with a flexible diaphragm instead of a piston. The stroke is therefore much shorter, but owing to the area a large quantity of water can be raised to a low head, usually not exceeding 10 ft.

Suction Pump. This is another form used in wells and boreholes, where it is usually power-driven, the principle being

as described above. The piston and valves, however, work in the lower part of the barrel at or near water level, the piston being operated by a crank at the surface through a long rod in the barrel. The part of the barrel above the piston is known as the rising main and the perforated filter at the lower end the strainer or snorer (or windbore). With this type of P. all the work of lifting water is done on the upstroke of the piston, which has to be allowed for by using a balance weight on the driving gear. To overcome this difficulty a double-acting P. is used in which there are 2 pistons, each containing a valve. Each piston or bucket has its own rod, the rod of the lower piston passing through the upper piston and its rod (see Figs. 4 and 5).

The Plunger Pump. The principle of this P. is shown in Fig. 6. As the plunger rises the pressure is reduced in the P. chamber, closing valve A and causing valve B to open, allowing the water to enter the chamber under air pressure. On the downward stroke valve B is closed and the water forced through valve A into the delivery pipe. In this type it is usual to fit an air vessel C above the valve A, containing air which acts as a cushion and damps out the impulses of the plunger, which would otherwise cause water-hammer in the pipes. A single-plunger P. is illustrated, but 3 or more plungers are used on one P., each plunger having its own suction and delivery valves but having common suction and discharge pipes. This arrangement gives a more even flow.

Horizontal Double-acting Pump. This is shown in Fig. 7, S being the suction pipe and D the delivery; 2 sets of suction valves, B and B1, and delivery valves, A and A1, are fitted and operated by the action of the plunger. With the right stroke B1 is closed and water forced through A1, while A is closed and water drawn through B. The left stroke closes A1 and opens B1, while B is closed and water forced through A. This type is commonly used for boiler-feeding work, the plunger being directly operated by a steam piston of rather larger area, so that steam at a pressure of 100 lb. per sq. in. in the boiler can be used to force water into the boiler at about 120 lb. per sq. in., i.e. with and against the pressure in the boiler.

Reciprocating P.s are generally used for raising comparatively small quantities of fluid to high heads, and have the advantage of being self-priming, as the piston exhausts the air in the suction pipe. It is usual, however, to fit a foot-valve on the suction pipe to keep it full of water and reduce time lost in exhausting air when starting.

ROTARY PUMPS. These include a wide variety of designs, the object of which is the elimination of impulses obtained in reciprocating P.s by providing in effect a piston moving continuously in one direction. No valves are required, as the flow is always in one direction, and as the air is exhausted from the suction pipe the

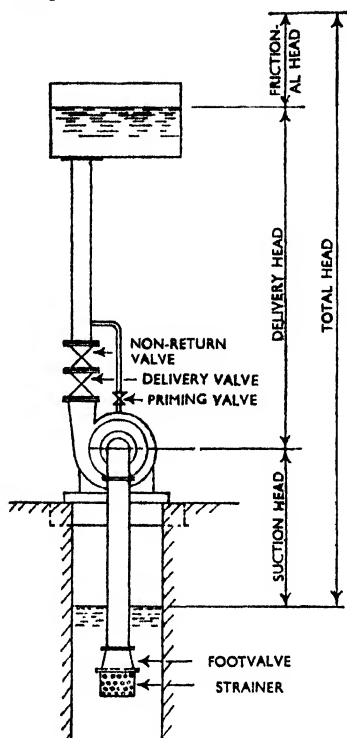


FIG. 1. PRINCIPLE OF PUMP WORKING AND TERMINOLOGY

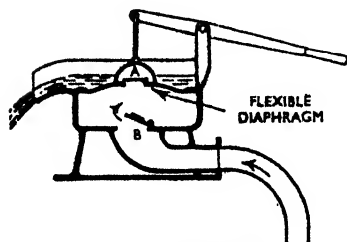


FIG. 3. DIAPHRAGM

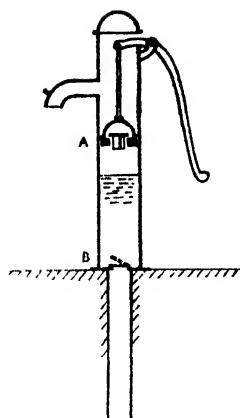
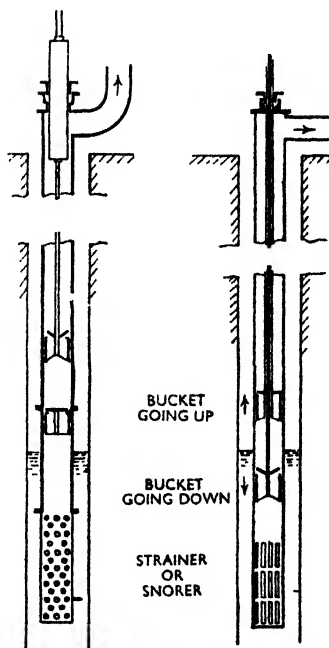


FIG. 2. SUCTION PUMP



SUCTION PUMPS FOR WELLS AND BOREHOLES

FIG. 4. SINGLE-ACTING FIG. 5. DOUBLE-ACTING

atmospheric pressure forces the fluid to the P. in the same manner as in reciprocating P.s. The suction head is usually limited to a few feet, as rotary P.s. rely on the running clearances instead of the more positive seal obtained with a plunger and valves. Viscous fluids such as thick oils can be handled with many types of rotary P.s. owing to the absence of valves.

Gear Pump. This (Fig. 8) is one of the most common types, and is used on most petrol engines for circulating oil to the bearings. One gear is driven, and this drives the other gear in the opposite direction, the oil being carried round by the gear teeth from the suction side to the delivery side of the P. The gears are made to fit closely in the casing, and the gear teeth in contact with each other form a seal which prevents the oil getting back to the suction side. These P.s. work at pressures up to 80 lb. per sq. in.

Drum Pump. This pump (Fig. 9) consists of a casing containing 2 drums coupled by gears situated outside the casing. One drum A has 2 projections similar to gear teeth in form which mesh with two grooves in the large drum B. During the rotation of the drums the teeth on drum A sweep the fluid through passage C, drum B merely acting as a seal or rotary abutment.

Other types of rotary abutment P.s. have different numbers of teeth or vanes but use the same principle (see Fig. 10).

Rotary Vane Pumps (Fig. 11). These consist of a circular casing containing a drum or rotor mounted eccentrically and fitted with sliding vanes. As the rotor is revolved the spaces between the blades increase and decrease in volume, thus drawing in the fluid through port A and expelling it through port B.

Both reciprocating and rotary P.s. are self-priming, that is, they are capable of exhausting the air in the suction pipe, if in good order, and will therefore start pumping without first filling the suction pipe with fluid.

CENTRIFUGAL PUMPS. These P.s. work on the principle of a fan, having a volute casing in which an impeller (a series of curved vanes) rotates at high speed, the fluid being thrown outwards by centrifugal force and then collected in the volute casing which directs the flow of fluid along the delivery pipe. This type of P. must be primed with fluid before it will start pumping, as there are no valves or seals in the P. itself. Once started, the column of fluid passing through the delivery pipe itself acts as a continuously moving piston, causing the atmospheric pressure to force water up the suction pipe as in the case of reciprocating and rotary P.s. It is usual to fit a foot-valve and strainer and a priming cock to enable the P. to be primed before starting. The advantages of the centrifugal P. are smooth flow, the small size of the P. required for output, the high speed of impeller shaft, permitting direct drive by electric motor or high-speed engine, and good control of flow. Unlike the positive P.s., a delivery valve

can be closed to reduce the starting load on the motor or to control the flow. The power required is in proportion to the weight of water lifted, so when the valve is closed the power required is only that necessary to overcome friction losses in the P.

The small sizes of P. (Fig. 12) have the suction pipe entering the centre of the impeller at one side, but as this causes an end thrust on the shaft the longer P.s. are fitted with a double suction which balances the thrust (see Fig. 13).

Turbine or Multi-stage Pumps. These are similar in principle, but consist of a number of impellers on one shaft, the fluid being guided from the delivery of one impeller to the suction of the next by means of guide vanes and ducts, each impeller building up additional pressure. Turbine P.s. are now built to give pressure of 1250 lb per sq. in. or over 2900 ft head. They are also built as borehole P.s. with up to 12 stages of small diameter driven by a shaft through the rising main guided by water-lubricated bearings from a vertical-spindle motor.

Submersible Pumping Unit is a type of equipment developed to meet the demand for a self-contained unit simple to install and economical in operation. The unit consists of a single or multi-stage vertical spindle turbine P. direct-coupled to an electric motor specially designed to work under water and mounted below the P. and strainer, a non-return valve being fitted above the P. to retain the water in the rising main. The complete unit is bolted direct to the rising main and lowered into the well or borehole until it is below the surface of the water, thereby eliminating suction troubles and the need for priming. This is especially useful when the motor is started automatically by means of a float or pressure switch, as the P. is always primed ready for starting. The short direct drive from the motor to the P. eliminates troubles due to alignment of long shafts, as when a borehole P. is driven from the surface, and the need for bearings and supports in the rising main, giving a more efficient unit. Submersible P.s. are available in a wide range of sizes from 5½ in. diameter for use in a 6-in. diameter borehole and capable of delivering 300-3000 gallons per hr to 430 ft head to P.s. suitable for 14-in. diameter boreholes, capable of delivering up to 100,000 gallons per hr. The special small-diameter motors used are of the squirrel-cage type, grease-lubricated, to give 6000-10,000 hrs running before requiring attention.

OTHER TYPES OF PUMPS. **Pulsometer Steam Pump** (Fig. 14). This P. is in a class by itself, using steam pressure directly on the surface of the water for forcing water up the rising main and using the vacuum created by condensation for filling the suction pipe with water. There are 2 P. chambers which work alternately, being supplied by steam through a ball valve V which oscillates between the 2 chambers. As steam enters chamber C the suction valve A is

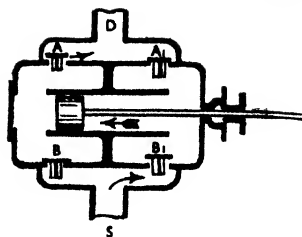
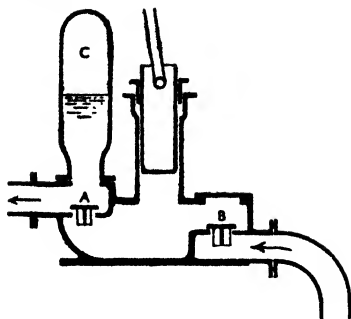


FIG. 7. HORIZONTAL DOUBLE-ACTING PUMP

FIG. 6. (left) PLUNGER PUMP

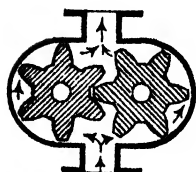


FIG. 8. GEAR PUMP

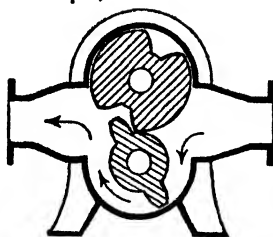


FIG. 9. 'DRUM' PUMP (ROTARY ABUTMENT)

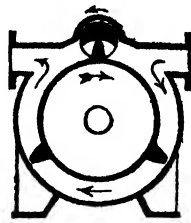


FIG. 10. ROTARY ABUTMENT PUMP (3 TEETH)

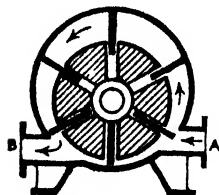


FIG. 11
ROTARY VANE PUMP

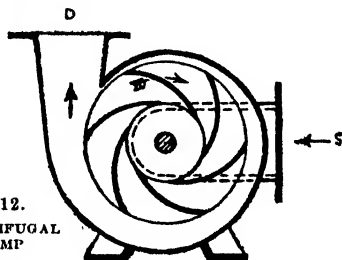


FIG. 12.
CENTRIFUGAL PUMP

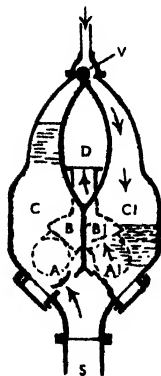


FIG. 14.
PULSOMETER STEAM PUMP

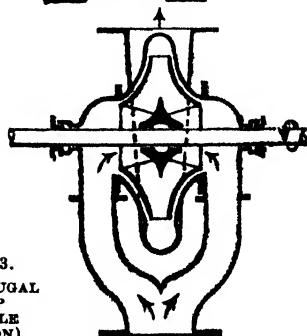


FIG. 13.
CENTRIFUGAL PUMP
(DOUBLE SUCTION)

closed and the water driven through discharge valve B until the water level in O reaches the level of the discharge chamber. Here, owing to the rapid increase in surface area, condensation of the steam takes place, causing valve V to be drawn over, closing the steam port in C, further con-

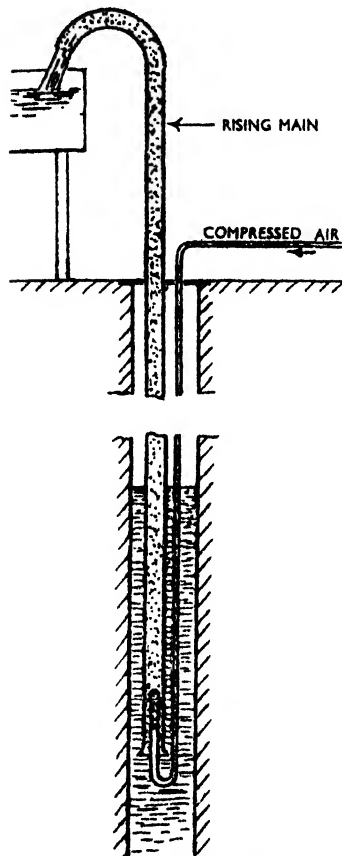


FIG. 15. AIR-LIFT PUMP

densation causing C to refill with water through valve V. The process is then repeated in chamber C1. This P. is used mainly by contractors for emergency work, as it requires no foundations and can be slung on a chain or rope. Steam can be supplied through a flexible pipe.

Air-lift Pump (Fig. 15). This is used in boreholes and has the advantage that no moving parts are in contact with the

water. A pipe supplying compressed air is taken to the lower end of the rising main and air is forced into the water through a series of small holes. The air mixing with the water in the pipe lessens its sp. gr. so that the weight of water outside the pipe forces up the mixture of water and air inside.

The Hydraulic Ram (Fig. 16) uses the force of a large flow of water to raise a small quantity to a high level. Water from a dam is led through a straight drive pipe to the ram, and flows through valve A until the velocity causes the valve to close. This stops the flow, causing a sudden rise in pressure which forces open valve B to the delivery pipe. After this energy is spent, valve A opens again by its own weight and the cycle is repeated.

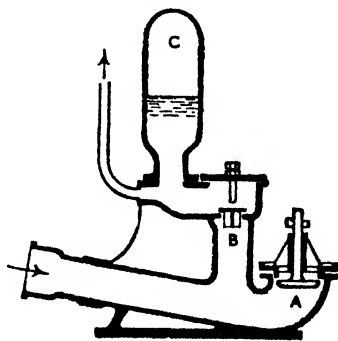


FIG. 16. HYDRAULIC RAM

An air vessel C is fitted above valve B to even out the flow and reduce damage to the pipes due to water-hammer. Rams are also made which will raise a supply of clean water from a well, using riv. water as the source of power operating a spring-loaded plunger which pumps the clean water. See also AIR PUMP; DIFFUSION PUMP.

Pumpnickel, bread made from coarsely ground unbolted rye. It is especially associated with Westphalia. It is also popular in some parts of the U.S.A. among consumers of Ger. extraction and may also be found on sale in the E. End of London.

Pumpkin (*Cucurbita maxima*, *C. pepo*), half-hardy plant of the family Cucurbitaceae, with large solitary yellow flowers and rough leaves which are sometimes eaten instead of spinach. The gourd-like fruit is used either as a vegetable, like vegetable marrow, or as a fruit in tarts, etc.

Pun is a kind of word-play using words that have the same sound but different meanings, as in 'Is life worth living? That depends on the liver'; or it may depend on different applications of the same word, as in Belloc's line 'His *shis* were scarlet, but his books were read.'

The P. is now generally witty or humorous, but in Shakespeare's time it was used in serious passages, as when Lady Macbeth, speaking of the murdered Duncan's blood, says:

'I'll gild the faces of the grooms withal,
For it must seem their guilt.'

In the 61st number of the *Spectator*, Addison outlines the history of the P. from the time of Aristotle. See also FIGURE OF SPEECH.

Punans, survivals of the Canac-Mongoloid tribes of SE. Asia (preceding the separation of Borneo, Sumatra, and Java from the mainland). They are a primitive nomad hunting tribe of Borneo living in the remote jungle and are physically akin to the Kenyahs and Klemantans. They live in small, much scattered groups and remain hidden in the depths of forest and jungle. Like the Kenyahs of the north-central highlands, they are short of stature with a comparatively long body and are very sturdily built; the head is comparatively short (sub-brachycephalic) and inclined to be square; the most distinctive characteristic is a well-developed nasal bridge, with nostrils shot far forward and upward; their skin is of a fine silky texture and either pale fawn or even of a greenish hue. A Punan community generally acknowledges a titular chief, whose authority depends on his age and reputation and is not formally defined. Monogamy prevails, though occasionally polyandry occurs. Endogamy within the group is not countenanced. Their God is Bali Penyalong, made in the image of a crocodile carried round by a Punan group wherever it goes. Burial and funeral rites are unknown, and the Punan idea of the after-life seems to be devoid of any doctrine of retribution as well as of any other moral significance. P. are great believers in charms and sorcery, and their medicine men are noted for their knowledge and skill. The chief art of the P. is that of the hunter and in tracking and trapping. The P. understand the Kayan dialect, but a simplified form of the Malay language has long been established.

Punch, alcoholic beverage. The name is derived from *panch*, Hindi for 5, the original drink containing 5 ingredients, including tea and arrack. P. is now composed of spirits, wine or beer, spice, sugar, fruit-juice, and water.

'Punch,' or 'The London Charivari,' founded by Mayhew, Landells, and Mark Lemon on 17 July 1841 with a capital of £25. The pub. in 1842 of the first Almanack, which became the talk of the day, caused the circulation to rise from 6000 to 90,000 copies. Since then its fame as a magazine of humour and political satire has become world-wide. It is noted for the high standard of both literary and dramatic criticism. Punch's most famous joke is its 'Advice to persons about to marry—don't.' Many well-known names have appeared among the contributors, including Thackeray, W. S. Gilbert, A. A. Milne, Sir Alan Herbert,

P. G. Wodehouse, and John Betjeman. Black-and-white artists whose work has graced its pages include Leech, Tenniel, Du Maurier, Phil May, Pont, Frank Reynolds, Fougasse, Langdon, Shepard, Emmet, Illingworth, Searle, and Brockbank.

Punch and Judy, the most famous and popular Eng. show for hand puppets. Punch, an abbreviation of PUNCHINELLO (q.v.), was brought to England about 1660 by travelling It. showmen. Judy, or Joan, is said to have derived from Mrs Noah in the old deluge play; she appeared as Mr Punch's shrewish wife, after 1688. The story is attributed to Silvio Fiorillo, a 17th-cent. It. comedian, and in Eng. marionette theatre was gradually adapted to popular tastes until an epic poem of Punch emerged, with traditional scenes in which the merry, shameless, shrill-voiced fellow beats his wife and baby, defies morality and religion, and outwits the Devil. See D. Calthrop, *Punch and Judy, a Corner in the History of Entertainment*, 1925; and C. H. Grandgent, *The Tragic Comedy or Comical Tragedy of Punch and Judy*, 1928.

Punchoon, see METROLOGY.

Punchestown, racecourse in co. Kildare, Rep. of Ireland, near Naas, famous for its steeplechases.

Punchinello (*Puleinella*), traditional figure of the *Commedia dell'Arte* (q.v.) and ancestor of Punch, having something in common with Harlequin (*Arlecchino*). He wears a black mask and a large nose, and is a rogue and braggart, with a rough country wit. Punch of the Punch and Judy (q.v.) show derives his name from the same source.

Punctuation is the insertion in written matter of stops and the other points to facilitate quick and accurate reading. Stops correspond to the necessary pauses and inflections in speech. P. was invented by the Greeks, but present symbols are derived from the Venetian printer Manutius (1450-1515). The stops proper, in descending order, are full stop, colon, semicolon, and comma. Other points used are the question and exclamation marks, hyphen, dash, brackets ('parentheses'), apostrophe, and quotation marks. Of these latter, many are comparatively recent additions.

The full stop, followed by a space and initial capital, marks the end of a period (sentence); it is replaced when requisite by a question or exclamation mark. The colon, formerly used to mark the main div. in an elaborate period, is now used almost exclusively to signify that there is something to follow, e.g. *There are four elements: earth, air, fire, and water*. It may be followed by a dash when it introduces a fresh paragraph. Commas mark the minor divs. of a sentence, or separate the items of such a series as *earth, air, fire and water* (enumeration). The most frequent uses of the comma are in enumeration and in the following 2 ways: *The ship will sail to-morrow, but we go aboard to-day* (co-ordinate sentences which are joined by a conjunction); *The earth, as we all know, revolves round the sun*

(parenthetical). In such a sentence as the ship example, a semicolon is indicated if such closely associated sentences are not joined by a conjunction: *The ship will sail to-morrow; we go aboard to-day.* Brackets ('parentheses') separate extraneous matter. The primary use of the dash is to mark an abrupt pause or change of construction: *All about—what do you think?* It is often used in lieu of brackets, and less properly as a maid-of-all-work in lieu of commas, semicolons, and colons. It is an awkward and ugly stop, which should not be used unnecessarily. The question mark is used after a sentence in question form or spoken interrogatively: *You will come?* The exclamation mark follows an exclamation, or an emphatic prayer or command. If used after an affirmative sentence, it expresses dissent or contempt: *She expected her house to be built in a week!* The hyphen, when used to mark an unfinished word at the end of a line, is a very ancient device. It is now also used extensively to unite 2 or more words thus: *red-hot, self-esteem*. By a curious convention, it may not be used between adjective and noun, even when the compound has a special sense, e.g. *cast iron, square leg*; except when the compound is used adjectivally, e.g. *cast-iron pipes*. Nor may it be used between a recognisable adverb and adjective; write *a highly respected man; a much esteemed man*. The apostrophe formerly marked an elision, e.g. *belov'd*. Now its chief use is to mark the possessive case, thus: *men's clothes, St Thomas's Hospital*. With plurals ending in *s*, the apostrophe follows the *s*, e.g. *old wives' tales*. Quotation marks, commonly called inverted commas, which may be written either as 'single' or "double" quotes, are in fact literally inverted commas followed by apostrophes. They signify that the words enclosed are those actually used, e.g. *'I am down in the dumps,' she said; She was 'down in the dumps,' she said.* By a natural extension quotation marks are also freely used in handwriting and typescript to signify that a word or phrase is used in a technical or slangy sense. They should never be used in this fashion needlessly, as they are ugly and distracting, especially in print. Contractions are usually indicated by adding a point when the word is unfinished, an apostrophe when the elision is in the middle of a word: *Yorks., won't*. See R. A. Skelton, *Modern English Punctuation* (2nd ed.), 1949; G. H. Vallins, *Good English*, 1951.

Pundit (Hind. *pandit*, learned man), teacher in India, especially a Brahman versed in the Sanskrit lore and language, and in the science, laws, and religion of the Hindus.

Pungwe, riv. of Portuguese E. Africa, flowing E. from the Manica tableland, then SE. to the Indian Ocean, discharging N. of the Buzi estuary at the important port of Beira.

Punic Wars, see CARTHAGE and HAN-NIBAL.

Punishment. For civilian P. see BORSTAL TRAINING; CAPITAL PUNISHMENT; CRIMINAL LAW; FINES; FLOGGING AND WHIPPING; JUVENILE OFFENDERS; PENAL SERVITUDE; PENOLOGY; PRISONS.

Punishment in the Royal Navy is awarded under the powers conferred by the Navy Discipline Acts, 1884 and 1886, amended by Queen's Regulations. The Articles of War specify both the various offences against naval discipline not punishable under ordinary law, and civil offences which are also punishable by naval courts-martial. For serious offences courts-martial are ordered, but captains of ships of and above the rank of commander are empowered to award summary P. up to 3 months' detention or imprisonment and dismissal from the service with or without disgrace, which latter involves forfeiture of all medals, pay, and pensions, together with inability to serve under the gov. in any capacity. Lesser summary P.s include disrating, stoppage of leave and pay, extra work, etc., and may be awarded (on written authority delegated by the capt.) by more junior officers. P. by courts-martial may involve, not only disrating or loss of seniority (in the case of an officer), but also death, long terms of imprisonment, and dismissal from the service. Officer offenders are always tried by court-martial, but during wartime disciplinary courts may be convened to deal with junior officers.

Punishment in the Army is authorised by the Army and Air Force Acts, 1955, which came into force on 1 Jan. 1957. Military offences are dealt with in sections 24-69, and civil offences in section 70. The P.s in respect of these are set out in section 71 (for officers) and 72 (for warrant officers, N.C.O.s, and men). For officers the scale of P. comprises death, imprisonment, cashiering, dismissal from Her Majesty's service, forfeiture of seniority of rank, reprimand, stoppages of pay (where the offence has occasioned any expense, loss, or damage). The scale for those other than commissioned officers is death, imprisonment, discharge with ignominy (or, in the case of a W.O., dismissal), detention for a term not exceeding 2 years, reduction in rank (in the case of W.O.s and N.C.O.s), forfeiture of service (in the case of desertion), reprimand (in the case of W.O.s and N.C.O.s only), forfeiture of pay (when the offence is committed on active service; the period of forfeiture must not, however, exceed 90 days), a fine (in cases of drunkenness), stoppages of pay (where loss, damage, or expense has been incurred). Offences under the Army Act are dealt with by courts-martial (q.v.).

Punishment in the Royal Air Force is regulated by the Air Force Act, 1955, and Queen's Regulations and Air Council Instructions for the R.A.F. The Air Force Act, 1955, like the Army Act, 1955, has no continuous operative force, but was brought into operation on 1 Jan. 1957 for a period of 5 years, subject to an Order-in-Council by the Queen continuing

the Act in force from year to year. The Act provides for the making of Rules of Procedure, and these regulate the procedure of courts-martial and deal with various other matters, including the confirming and reviewing of sentences.

The Air Force Act, 1955 (sections 24-69), specifies various offences against service discipline which are not punishable by the civil or ordinary law of England, and in section 70 makes additional provision for the P. in certain circumstances of offences which are punishable by the ordinary law. The P.'s possible for service offences under the Act are laid down in the following scale, namely, for officers, death (reserved for offences in relation to the enemy and mutiny with violence), imprisonment, cashiering, dismissal, forfeiture of seniority, severe reprimand, reprimand, and stoppages of pay; and for airmen death (limited as above), imprisonment, discharge with ignominy, dismissal (for W.O.s only), detention, reduction in rank or forfeiture of seniority (for W.O.s and N.C.O.s only), forfeiture of service (for the offence of desertion), severe reprimand or reprimand (W.O.s and N.C.O.s only), forfeiture of pay (for an offence on active service), fine (for the offence of drunkenness), and stoppages of pay.

Serious offences are normally dealt with by either a general or a dist. court-martial. An officer or warrant officer may be tried only by a general court-martial, but airmen may be tried either by a general court-martial or a dist. court-martial according to the seriousness of the offence. A dist. court-martial cannot award the death penalty. When an offence is committed on active service trial may take place by a field general court-martial where it is not practicable to hold a general court-martial; a field general court-martial can, except in certain circumstances, award the same P.s as a general court-martial.

In dealing with offences under section 70 of the Air Force Act, 1955, i.e. offences against the ordinary law, a court-martial may only award the P.s provided in the Act subject to the P. awarded being not more than a civil court would have awarded under ordinary law. In addition to the above, Queen's Regulations and Air Council Instructions for the R.A.F. make provision for the summary disposal by commanding officers of offences which are not of a serious nature. The P. in such cases may take the form of field P. (on active service only), severe reprimand or reprimand (N.C.O.s only), forfeiture of pay (on active service only), detention not exceeding 28 days, fine (for drunkenness), stoppages of pay, and minor punishments, such as extra duties.

Punjab (from 2 Persian words meaning 'five rivers'), region of the Indian subcontinent, watered by the Indus and its great affluents, the Jhelum, Chenab, Ravi, Beas, and Sutlej. It is bounded on the W. by the NW. Frontier Prov., on the N. by Kashmir, on the E. by Uttar Pradesh, and on the S. by Sind and

Bahawalpur. The physical character of the N. contrasts strikingly with that of the S. dists. In the N. the whole surface is traversed by spurs from the Himalayas, which enclose deep valleys. In the S. the surface is unbroken by any important eminence, with the exception of the Salt range, about 2000 ft high, between the Indus and the Jhelum. The climate in the plains is most oppressively hot and dry in summer, but cool and sometimes frosty in winter. Little rain falls except in the dists. along the base of the Himalayas. This caused the Brit. administration to utilise the rivs. for irrigation purposes. A network of canals was constructed; these canals included the Bari Doab, Chenab, Sirhind, Jhelum, and W. Jumna. In 1946 over 15,000,000 ac. of land in P. were irrigated in this way. The chief crops are wheat, indigo, sugar, cotton, tobacco, opium, buck-wheat, rice, barley, millet, and maize. Cattle are reared, and dairying and wool and hide industries are carried on. Over a quarter of the tilled area is devoted to wheat cultivation; both this and barley are winter rain crops, reaped in Mar. and April. Sheep are reared for their wool. There are rich deposits of rock-salt, and oil is found in the Attock region.

History. The early hist. of the P. is that of a region which by situation became the battleground and melting-pot of a succession of invading races sweeping in via the passes through the NW. frontier. Alexander the Great invaded the P., and reached the R. Beas (Hyphasis). He turned back in 326 BC, and d. in 323. Gr. rule ended at his death. From the 3rd cent. BC until the 10th AD the P. was subjected to a series of foreign invasions and was split into a number of weak and petty states. It was thus easy for the Turkish aggressors of the 10th and 11th cents. to conquer the region and wipe out Buddhism. Delhi became the cap. of a Turkish or Afghan sultanate; but the country had little peace. There were intermittent Mongol attacks: Genghis Khan (q.v.) devastated the P. in 1221. In 1398 Timurlane proclaimed himself emperor of India after sweeping across the P. From 1556 to 1707 the P. was ruled by a succession of Mogul emperors, of whom Akbar was the greatest. Lahore was estab. as the cap. After 1707 the P. was annexed by the Marathas, who, in turn, were defeated by a Muslim coalition. In 1799 Ranjit Singh (1780-1839) laid the foundations of a Sikh kingdom in the P. (see SIKHS), and by 1820 he had consolidated the P., from the Sutlej to the Indus, under his rule. Relations between the P. and Britain were, however, already strained before Ranjit Singh's death. After it war soon broke out. Two wars were fought, in 1845 and 1848-9. After Gough's victory at Gujrat (1849) the P. was annexed. It was at first governed rigorously but fairly by a Board of Three, but by 1853 the P. was administered by a chief commissioner who in 1859 was made lieutenant-governor. It was under Dalhousie's Indian

administration that the P. was given a network of military roads of the greatest value to the people.

The P. became of the first importance in the Indian mutiny, the viceroy being able to do little from Calcutta. If Brit. rule there had collapsed, as it had in the NW. provs., probably the whole of N. India would have been overwhelmed. Fortunately the new prov. supported the Brit., and the fact that the initiative in the rebellion came from the Bengal army seems to have been decisive with the Sikhs.

Serious semi-revolutionary disturbances occurred in the P. (as well as in other provs.) in 1919 following the deportation of 2 Nationalist leaders (see AMRITSAR). The following 10 years saw a great advance in education.

The P. made considerable progress under prov. autonomy, introduced in 1937, owing largely to the Unionist Party of Sir Fazl-i-Hussain, a far-sighted political leader. Their efforts included extension of education, road construction, expansion of public-health facilities, hospitals, encouragement of industry, and improvement of agriculture. But the outstanding feature of P. hist. under prov. autonomy to 1945-6 was its possession of a stable ministry with a declared policy of equal opportunity for all.

The P., the bp. of the Muslim League ideal of Pakistan, was the greatest sufferer on its realisation. Fear of Hindu domination had become an obsession with the Muslims of the prov.; the more so as the peasantry were predominantly Muslim, while the traders and money-lenders of the prov. were mostly Hindus and Sikhs. Early in 1947 there were communal disturbances in many parts, including Lahore, Multan, and Amritsar, and many shopkeepers were butchered by looting mobs of Muslims. The position was complicated as the 4,000,000 Sikhs, with their martial traditions, finding their community would be cut in half by the imminent partition, decided to evade domination by the Muslims.

Before the partition of 14 Aug. 1947 some 500,000 Hindus and Sikhs had already moved across the future frontier into E. P.; after that date another 1,500,000 moved across and a further 500,000 were on the move. In the opposite direction the Muslim minority in E. P., poorer and less well organised, was moving from dists. adjacent to the border; a million had crossed, another million were on the move W., and about 2,500,000, too far from the border to start moving, were crowded together for self-protection in camps and in various villages and townships. Despite efforts at conveying refugees across the new frontiers, there were many clashes between Muslims and non-Muslims. The full tally of victims in the orgy of murder and rapine can never be given, but it is estimated that half a million lives were lost.

The partition gave Pakistan the W. P.,

and India the E. P. See PUNJAB, EAST; PUNJAB, WEST; INDIA; and PAKISTAN.

See F. L. Brayne, *The Remaking of Village India*, 1929; Lilian Prior, *Punjab Prelude*, 1952.

Punjab, East, or Punjab (India), state of the Indian Union consisting of the portion of the Punjab (see above) which went to India after partition of the sub-continent in 1947, together with the Patiala and East Punjab States' Union, added in 1956.

For terrain and hist. see PUNJAB.

Development. The state is a surplus area in food grains, and grows wheat, barley, rice, gram, maize, millets, sugar, groundnuts, and cotton. It also produces fruit and vegetables for export, and has a growing fruit-preserving industry. It has 5,600,000 ac. of land under irrigation and will gain further from the Bhakra Nangal project, biggest of the river schemes, which will cost 1,570,000,000 rupees (1 rupee = 1s. 6d.) and involves the construction at Rupar of the highest straight gravity dam in the world, a 680-ft-high dam across the Sutlej. E. P. has a big sports-goods industry (formerly based on Sialkot) and hosiery and art silk industries.

Culture. The people are predominantly Punjab Hindus and Sikhs, members of a reformist Hindu sect set up by Guru Nanak in the 15th cent. (see SIKHS). They speak Punjabi, written with the Gurmukhi script evolved by the early Sikh gurus to write their sacred texts. The univ. of the P. has 86 affiliated colleges with 37,000 students.

Government. The governor has ministers responsible to an elected assembly of 154. In India's Parliament E. P. has 11 members of the Upper and 22 of the Lower House.

The cap. is Chandigarh (q.v.). Other tns of interest are Simla, the provisional cap. and former summer cap. of India (pop. 46,000), Amritsar, holy city of Sikhism (pop. 326,000), Jullundur (pop. 169,000), and Ludhiana (pop. 154,000). Area 46,616 sq. in.; pop. 16,000,000.

Punjab, West, the area of the Punjab (q.v.) allocated to Pakistan after partition in 1947 and administered as an autonomous prov. during 1947-53, after which it became part of W. Pakistan Province. It has an area of 63,134 sq. m. and a pop. of 18,800,000. Of a sown area of about 20 m. ac., wheat accounts for 7,400,000 ac., rice for 1,000,000 ac., cotton for 2,000,000 ac. Sugar and oilseeds are also produced, and fruit is grown and processed for export. It has great cattle wealth. Many industries closed down after the partition, often owing to the migration of owners and workers to India, but they have reopened or been replaced by others. There are textile works, sugar factories, tanneries. Attock is a major source of oil. Sialkot specialises in sports goods and surgical instruments, Gujranwala in cutlery. 9,000,000 ac. of land are irrigated by various major

canal schemes based on the Indus and its tribs. A feature is the system of link canals which carry water from one trib. to another to bring irrigation to the areas of greatest shortage. The Thal irrigation scheme will bring 2,000,000 ac. of virtual desert under crops. W. P. is conducting an education drive, literacy being 10 per cent; the P. Univ. has an enrolment of 30,000 students. Lahore (pop. 489,000), Rawalpindi (pop. 237,000), Multan (pop. 190,000), and Lyallpur (pop. 179,000) are the chief tns.

Punkah, or Punka (Hind. *pankhā*, fan), device for ventilating apartments used in India and tropical climates. It is generally a movable fan-like frame of wood covered with canvas or calico and hung from the ceiling. A servant outside the room keeps the fan in motion by pulling a cord passing over a pulley through the wall.

Puno: 1. Dept of SE. Peru, bordering on Bolivia, almost enclosed by ranges of the Andes. It was formerly a silver-mining area; stock-raising and mining are now the chief occupations. Area 26,140 sq. m. Pop. 770,380.

2. Cap. of above, port on the bay of Puno and the W. shore of Lake Titicaca, 110 m. NE. of Arequipa. Alpaca wool is exported and some silver mines are still worked. Pop. 16,000.

Punt, flat-bottomed shallow riv. boat, broad and square at both ends, and propelled by a pole. It has no stem, keel, or sternpost, and the width at each end is at least one-half of the width at the widest part. Subject to these conditions, a P. may be any length or width.

Punta Arenas, Chile, see MAGALLANES.

Puntarenas: 1. Prov. of Costa Rica, Central America, extending along the SE. coast. Area 4300 sq. m. Pop. 107,695.

2. Cap. of the prov. of the same name, on the E. coast of the Gulf of Nicoya. There is trade in cattle, sugar, coconuts, rubber, and coffee. Shark and other fishing is carried on. Pop. 17,060.

Pupil, in Scots Law, signifies a girl under 13 or a boy under 14. Between these ages and 21 they are termed minor (q.v.). The distinction is of importance in the law of contract, as a pupil has no power to contract, though his tutor may do so on his behalf, whilst a minor has a limited power to contract.

Pupil, the circular central aperture in the iris curtain immediately in front of the crystalline lens of the eye, through which light may pass and be focused in the retina. Under the influence of intense light and when viewing near objects the P. contracts, but poor light or the viewing of distant objects generally causes it to dilate. This contraction and dilatation may also be caused by the action of various drugs. For instance, opium causes it to contract, while belladonna and cocaine cause it to dilate. This action affords a method of detecting medically whether a person is addicted to this habit. The P., in cases of nerve degeneration, sometimes fails to react to the influence of light. See also EYE.

Pupillus, Orbilius (113-c. 23 BC), Rom. grammarian and schoolmaster, b. Beneventum. He opened a school at Rome in 63 BC, and among his pupils was Horace, who gives him a reputation for flogging. He wrote a work referred to by Suetonius as *Perialogos*.

Pupin, Michael Idvorsky (1858-1935), Amer. physicist and inventor, b. Idvor, Serbia. He studied physics and mathematics at Cambridge Univ. and, under van Helmholtz, at Berlin Univ. He was prof. of electromechanics at Columbia from 1901 to 1931, and became known as the inventor of telephonic devices and for his discoveries concerning X-rays. His best-known work is his autobiography *From Immigrant to Inventor*, 1923, awarded the Pulitzer prize for 1924.

Puppets, figures, usually jointed, used in dramatic presentations, and made to move by various methods; they include the following: *marionettes*, jointed P. operated by wires or strings from above; *rod P.*, jointed, operated by rods from below; *glove P.*, manipulated by the hand; *flat P.*, unjointed, used in model theatre shows and 'juvenile drama'; *shadow P.*, flat, jointed figures, whose shadows are cast on a screen: these are sometimes transparent, and are worked by rods. The origin of P. is uncertain, but there is proof of their existence in Greece and Egypt earlier than in India, where, according to tradition, the god Shiva fell in love with a puppet. Many small painted figures with movable limbs, used in religious rites, were found in tombs at Thebes and Memphis. Marionette theatres flourished in all the large tns of ancient Greece, and this art was undoubtedly borrowed by the Romans and carried through central Asia to the Orient. Shadow P. in China (140-86 BC) developed from bone or horn images used in magical celebrations. This high form of artistic representation, with its bizarre figures and grotesque humour, reached its peak in Java, where P. representing ancient heroes and ancestors resemble fantastic ornaments. Oriental puppet-shows were originally religious; comic figures were introduced for light relief, and gradually became increasingly important.

European P. derived from painted images and mechanical statuettes used in religious festivals. Marionettes were introduced to Europe by travelling It. showmen, and each country gradually adapted It. conventions, devices, and dialogues to national tastes and folklore. It. showmen estab. a permanent theatre in London in 1573, and Capt. Pod was the first Eng. showman (1599). In France the first reliable records of P. are of those shown by Brioché in the second half of the 17th cent., although they must have existed in France, Germany, and other European countries long before then. String marionettes predominated in the 16th cent., but in the 17th cent. hand P. took precedence, and typical figures such as Punchinello, Punch, Hanswurst, and Guignol appeared. The puppet theatre played a considerable role in

all civilised European countries, and was attacked incessantly by the regular theatre and the Church. In the 18th cent. Punch was included in most of the dramas shown by Robert Powell, a famous showman whose booth was opposite St Paul's. In Italy, where marionette theatres had long held the same prestige as other theatres, *fantoccini* were used for the performance of long plays, ballets, and grand opera. The art declined gradually, but was revived at the beginning of this century by artists who realised its importance as a dramatic medium, and as an educational development. Puppetry is again enjoying a revival in public estimation, and marionette or puppet shows are extremely popular. Glove P. are most frequently

Vyāsa, and were probably admitted to the sacred literature of Hinduism in the 6th or 8th century AD. See H. H. Wilson (trans.), preface to his *Vishnu Purāna*, 1840; E. Burnouf and E. L. Havette-Besnault (ed. and trans.), *Bhāgavata Purāna*, 1840-84; F. Neve, *Les Pourānas*, 1852; J. Muir, *Sanskrit Texts*, 1868-71; A. B. Keith, *Sanskrit Classical Literature*, 1923, and *History of Sanskrit Literature*, 1928.

Purbeck, Isle of, peninsular dist. of SE. Dorset, England, between Poole Harbour and the Eng. Channel, terminating in St Albans Head. Purbeck Hills (chalk) traverse it from E. to W. P. was once a deer forest, but the scenery is now mainly heathland and downs. Corfe Castle is in the centre. Marble, limestone, pipe-clay,



MARIONETTE THEATRE: INDIA

E.N.A.

used nowadays, the fingers inside animating them. A great success has been achieved on television by the marionette Muffin the Mule (originated by Annette Mills) and the glove puppet Sooty (manipulated by Harry Corbett), both of whom now rank as big television stars with children and adults alike. See C. Magnin, *Histoire des marionnettes en Europe*, 1852, 1862; Helen H. Joseph, *A Book of Marionettes*, 1922; M. von Boehn, *Dolls and Puppets*, 1932; J. Bussell, *The Puppet Theatre*, 1946; and M. Batchelder, *The Puppet Handbook*, 1947.

Purāna (Sanskrit *purāna*, old), name of each of a class of sacred Hindu poetical works in the Sanskrit language, treating of the creation, destruction, and renovation of worlds, the genealogy of gods and heroes, the reigns of the Manus, and achievements of their descendants. Like the Tantras, they are the chief foundation of the popular creed of the Brahminical Hindus. There are 18 chief P.s., and 18 supplementary 'Upa Purānas.' They are supposed to have been compiled by

and potter's clay are found. See Ida Woodward and J. W. G. Bond, *Purbeck*, 1908.

Purbeck Beds, in geology, are Upper Jurassic fresh or brackish water sediments exposed in the S. of England. They consist chiefly of shales, marls, and limestones, but include bands of loamy earth known as Dirt-beds. Gypsum occurs in the P. of the Weald, where it is mined. The Purbeck marble is a shelly limestone used as an ornamental stone.

Purcell, Henry (1659-95), composer, b. probably in Westminster, London. Tradition says that his father was Henry P., master of the abbey choristers, but it is now thought that P. may have been the son of Henry's brother, Thomas. P. was a chorister at the Chapel Royal. As a youth he was assistant to Hingston, keeper of the instruments at the Chapel Royal. His position was really that of an unpaid apprentice, and he succeeded Hingston as keeper in 1683, being made 'composer in ordinary' to the king in the same year. He succeeded Blow as organist of Westminster Abbey in 1679,

having earlier been one of Blow's pupils. In 1682 he became one of the organists at the Chapel Royal. These official duties required the composition of much church music; his many anthems, scored with orchestra and organ to suit the taste of Charles II, include *My Heart is Inditing* for the coronation of James II. His *Te Deum* and *Jubilate*, written in 1694, are outstanding. He wrote an opera *Dido and Aeneas*, the greatest since Monteverdi and in a sense the first opera fit for the modern stage, and sev. quasi-operas and masques, notably *King Arthur* (with Dryden) and *The Fairy Queen* (adapted from *A Midsummer Night's Dream*). His catalogue further includes music for many plays, odes, and welcome-songs for the court, canticles, duets, and songs, fantasies for strings, instrumental sonatas, harpsichord suites and pieces, etc. P.'s music shows the influence of Blow and also of Lully and the It. violinist-composers; in skill, power, and originality he has never been surpassed by any other Eng. composer. He is Handel's equal in melodic beauty. He d. in London, and was buried beneath the organ in Westminster Abbey. See lives by D. Arundell, 1927; A. K. Holland, 1932; and J. A. Westrup, 1937.

Purchase Systems, see COMMISSION, MILITARY.

Purchase Tax, tax introduced by Sir (later Viscount) John Simon, as chancellor of the Exchequer, in 1940, and levied on the purchase of specified goods from registered dealers (generally wholesalers). Simon introduced the tax as a source of substantial revenue for his second war budget. While discouraging unnecessary spending at home, P. T. was not intended to touch exports, raw materials, food, drink, or articles already subject to a heavy duty. A register of wholesalers was to be compiled, and it would be the business of the seller to get the tax from the purchaser at the time he received payment for the goods. Sir Kingsley Wood, who succeeded Simon in the same year, revised the earlier plan considerably. He abolished the flat rate which had been proposed by his predecessor and substituted a rate of 3½ per cent on the wholesale value of luxuries and goods which could be dispensed with or replacement of which could be postponed, and one of 16½ per cent on the wholesale value of a wide range of goods. In the lower rate schedule were included articles like clothing, boots, and shoes (excepting children's clothing and footwear). The rates have subsequently varied widely, often disturbing trade. P. T. remained after the war and became one of the most prolific taxes, yielding £390m. in 1955.

Purdah (Hind. and Pers. *pardah*) (E. India), curtain, especially one serving to screen women from being seen by strangers; hence, figuratively, the Indian system of secluding women of rank.

Purfleet, see THURROCK.

Purgatives, see APERIENTS.

Purgatory ('a place of cleansing,' from Lat. *purgare*), name given to the place in which the souls of the departed who die

in a state of grace but have not fully paid the temporal penalty for their sins are detained until they have done so. According to the Council of Florence (1438-45), the souls in P. can be helped by the prayers of the faithful on earth. This doctrine is implicit in the practice, dating from early Christian times, of offering prayers for the dead, and is supported by 2 Macc. xii. 46. It was denied by Luther, but reaffirmed by the Council of Trent (1545-63). It is held, though in a less precise form, by the Orthodox Church, representatives of which assisted in the formulation of the doctrine at Florence. The suffering of P. consists in being deprived of the vision of God for a season, and consumed with the fire of love and longing for Him. Cf. J. H. Newman, *The Dream of Gerontius*. See also PARADISE.

Purl, see JUGGERNAUT.

Purification of the Blessed Virgin Mary, Feast of the (2 Feb.), originated in Jerusalem at the end of the 4th cent., was adopted by Constantinople in 542, and spread throughout the E. and finally to Rome, perhaps under Gregory I (590-604). It commemorates the presentation of Christ in the temple (cf. Lev. xii) on the fortieth day after his birth (2 Feb.) and the purification of Mary (cf. Ex. xiii. 9). It acquired its predominantly Marian character in the W. by the addition of the procession with candles in honour of Mary, under Sergius I (687-701). See CANDLE-MAS.

Purim, or the Feast of Lots, Jewish minor festival, commemorating the deliverance of the Jews of Persia from the plot of Haman. The book of Esther (known as the *Megillah*) in which these events are recorded is read aloud in the synagogue on P., which is celebrated on *Adar* 14 (in a leap-year *Pesad* 14). This was the day Haman had planned to kill the Jews, having fixed it by casting lots. A special banquet (*se'udah*) is held in the afternoon of the feast and is often accompanied by plays and masquerades. In the Middle Ages many Jewish communities instituted local P.'s to celebrate deliverance from danger or persecution.

Purines, class of nitrogenous organic compounds having the skeletal structure of uric acid (q.v.). Apart from urea (q.v.), uric acid is the most important nitrogenous waste product of animal metabolism. The parent substance of the P. is purine itself, which is a trihydroxy uric acid. It is of little importance compared with many of its derivatives, as it does not occur naturally. The purine nucleus has its atoms numbered so that a systematic nomenclature for the numerous compounds of this class can be built up. The most important P. are caffeine, which occurs in coffee beans and tea leaves and is responsible for the stimulating action of these beverages on the nerves and heart; theobromine, which is one of the active ingredients of cocoa and chocolate. Xanthine, hypoxanthine, adenine, and guanine are normal constituents of many animal tissues.

Puritans, in the days of Elizabeth I and the early Stuarts, name applied as a term of derision to a party in the Church of England who wished to purge the estab. eccles. system from so-called popish abuses. Later it came to include more revolutionary groups, many of which aimed at the entire destruction of Anglicanism. The name was in use at least as early as 1564, and refers to that purification in worship and doctrine to which all P. looked forward. The P. were all united in opposing the Church of England as they found it, but their constructive proposals differed vastly. This makes the P. in opposition (16th and early 17th cents.) relatively easy to define; but the P. of the Civil war period, and of the era of disintegration which followed it, include so many types that generalisation is frequently dangerous. The 2 main divs. of P. in the 16th cent. (later known as Presbyterians and Congregationalists) both followed Calvinist doctrines, but differed in their views on Church government. But in the next century the term came to include Baptists, Unitarians, and Quakers, whose theology was frequently antinomian or Arminian. The earliest P. were a party within the estab. Church, regarding themselves as orthodox Anglicans, and (like Pym and Prynne) heartily disliking and repudiating the name Puritan. But many later P. resisted the idea of any estab. Church, and professed toleration of other opinions in varying degrees.

Extreme Protestant views had penetrated into England under Edward VI, and during Mary's reign a number of clergy fled to Calvinist Geneva and absorbed Calvin's ideas (see CALVINISM). In spite of Elizabeth I's attempt at a *via media* in Church affairs, therefore, a strong nucleus of potentially Puritan opinion existed in England even at her accession. Many of her bishops, Swiss exiles themselves, at first condoned the practice of a Protestantism more rigid than that envisaged in the settlement of 1559. Under Archbishop Whitgift the machinery of the high commission court (instituted in 1559) was vigorously used against the P., but such severity came too late. The number of P. increased, the movement being helped because there undoubtedly still existed in the estab. church the abuses of simony, pluralism, and many ill-paid and ignorant lower clergy for which the Church of pre-Reformation times had been blamed. In 1582 a gathering of Puritan clergy, under the leadership of Cartwright, expressed its discontent with the present condition of the Church in a formal document, but this solidarity was only momentary. While Elizabeth lived the P., though by no means quelled, were held in check.

On James's accession the P. became more active, and at the Hampton Court conference 750 clergymen set forth what became the basis of the Presbyterian form of Puritanism in England. James, however, rejected their demands. Laud's

religious policy brought many moderates into the Puritan party, and Puritanism became very largely anti-episcopal as a result of the actions of Laud and his colleagues. During the Long Parliament, which assembled in 1640, Presbyterian Puritanism seemed on the eve of realisation. In 1642 bishops were deprived of their seats in Parliament; episcopacy, including the hierarchy of archbishops and bishops, deans and chapters, etc., was abolished in 1645; the Book of Common Prayer was thrown over and its use declared penal; finally, in the same year, the 'discipline' was estab., whereby an attempt was made to enforce government by presbyteries in all churches throughout the realm. But this was never enforced, for, except in a number of restricted localities, full Presbyterianism never gained a wide following in England. Its power in 1645 depended largely on the influence exercised by the Scottish Army. Eng. Puritanism had some of its roots in anti-clericalism, and the minister was thus as distrusted as the Anglican parson. In a sense, too, though it was itself intolerant, it was an expression of a secular individualism which Scottish Presbyterianism did not at that time possess. In the years covering the commonwealth and protectorate it became clear that many P., particularly those in influential places, wanted little more than a modified Anglicanism; and the use of the Book of Common Prayer could not in fact be eradicated. The more extreme P. were divided into numerous sects, of which the Congregationalists (as they later became) were probably the most influential, though the various Baptist groups were numerically fairly strong.

With the Restoration of 1660 the insecure fabric of estab. Puritanism was swept away and Anglicanism, with the episcopal system and all that went with it, restored. But the P. had a lasting effect on the estab. Church and Eng. society as a whole, even though they failed to capture it. The 'Eng. Sunday' still retains some of the Sabbatarianism fought for by the P., as opposed to the so-called 'Continental Sunday.' Latitudinarians and Evangelicals are the descendants of Puritanism within the Church, while those who refused to conform with Anglicanism formed a powerful group of non-conformist sects whose very existence and ideas have influenced every aspect of Eng. life. It was no accident that the Eng. radical political thinkers of the 18th cent. came frequently from dissenting families. The P. of Elizabethan and Stuart times had an inborn hatred of religious rituals and ceremonies, and sometimes (as in the case of Cromwell and Sir Henry Vane the younger), though not always, a longing for greater liberty of conscience. After the Restoration, when it became obvious that the P. could never convert the whole country to their way of thought, they began to press more generally for religious toleration, aiming merely at securing acceptance for themselves and thus, by circumstance, they

became the champions of freedom of worship. But the practical expression of early Puritanism, where it did gain supremacy, as in the 17th-cent. Massachusetts, shows that serious and high-minded P., who abandoned England because of consistent religious persecution, proved as intolerant to those of differing views as their Eng. opponents had been to them.

The P.s' noblest literary expression is in the pages of *Paradise Lost* and *Pilgrim's Progress*, while critics have pointed to a Puritan inheritance in the works of authors as different as Defoe, Hawthorne, George Eliot, Bernard Shaw, and Sinclair Lewis. Such a list illustrates the various and sometimes conflicting facets of Puritanism and the varying tendencies to which it gave rise. Thus while many P. were lovers of music, it is still true to say that the Puritan spirit was responsible for the temporary banishment of music from religious services. It was responsible, too, for the repeated outbreaks of iconoclasm which ruthlessly damaged and even destroyed historic churches and abbeys, and in general, for that ill repute into which the arts and popular diversions alike fell. Until the 20th cent. the theatre continued to suffer from this influence. On the other hand, the Eng. character is richer for the intellectual honesty and practical but simple faith which flourished alongside much that was undoubtedly destructive, in the greatest of the P.

See E. Dowden, *Puritan and Anglican*, 1900; W. Shaw, *A History of the English Church, 1640-60*, 1900; S. R. Gardiner, *The First Two Stuarts, and the Puritan Revolution*, 1902; S. R. Gardiner (ed.), *Constitutional Documents of the Puritan Revolution*, 1906; H. W. Clark, *History of English Nonconformity*, 1911; A. F. Scott Pearson, *Thomas Cartwright and Elizabethan Puritanism*, 1925; R. H. Tawney, *Religion and the Rise of Capitalism*, 1926; F. A. Scholes, *The Puritans and Music*, 1934; A. S. P. Woodhouse, *Puritanism and Liberty*, 1937; W. Haller, *The Rise of Puritanism*, 1938; Margaret James, *Social Problems and Policy during the Puritan Revolution*, 1938; M. M. Knappen, *Tudor Puritanism*, 1939; W. Sohenk, *Social Justice in the Puritan Revolution*, 1949; and A. L. Rowse, *The England of Elizabeth*, 1950.

Purley, see COULSDON and PURLEY.

Purley, Diversions of, see TOOEK.

Purmerend, small tn in the Netherlands, on the N. Holland canal, 10 m. N. of Amsterdam. P. has important trade in cattle and cheese. Pop. 7820.

Purple Colours are obtained by an admixture of red and blue light rays. The colours vary from scarlet to violet according to the predominance of the red or blue rays. In the case of *paints*, P. C. are obtained by mixing red and blue pigments in varying proportions. Tyrian P., which was held in great repute in the anc. world, was obtained from the juice of a shell-fish called *Murex* or *Conchylium*. Owing chiefly to the luxurious-

ness of the P. cloth made in those times, P. became a symbol of royalty, and 'the purple' is used to-day with reference to the imperial dignity and to cardinals of the Rom. Catholic Church. See DYE.

Purple Emperor (*Apatura iris*), handsome high-flying butterfly, with rusty black wings, lustrous in the male and with 7 white spots and a transverse white band.

Purple Goatsbeard, see SALSIFY.

Purple Heart, military decoration of the U.S.A. It was the first decoration for conspicuous gallantry to be awarded by the U.S. Gov., being instituted by Washington in 1781. Later it fell into disuse, but was revived in 1932. During the Second World War it was given to all members of the forces who were wounded in circumstances entitling them to a wound stripe.

Purple-snails, see LANTHINA.

Purpura, genus of gastropod molluscs in the family Muricidae, contains several sub-genera, and is itself typical of the sub-family Purpurinae. It is closely related to the stingwinkle and *Murex* (see PURPLE COLOURS). The species, often known as whelks, are all predatory, and *P. lapillus*, the dog-whelk, feeds on the edible oysters after boring a hole through their shells.

Purser, officer in a ship's company who keeps the accounts and, usually, has charge of the provisions. In large passenger ships the P.'s dept is of the greatest importance, and the P. will have as his assistant the chief steward and a personnel of between three and four hundred stewards. He is responsible for the entire victualling of the ship, amongst many other duties. He has to act as host to the passengers, a position requiring considerable tact. In smaller ships, such as cargo liners, a P. is not needed and a chief steward combines the 2 jobs. One of the duties of a P. is to make up the portage bill, which is a detailed account of the financial transactions of every member of the crew and the amounts due to each man when the ship pays off. The badge of a P. consists of 2 white sleeve-bands, that of a senior P. has 3 bands, and of an assistant P. 1 band. The term paymaster is now obsolete in the Brit. Navy.

Purslane (*Portulaca oleracea*), small succulent ann. herb, native of tropical Asia. It is grown in gardens, the tops of the young shoots being cooked and eaten as a vegetable or pickle. Winter P. (*Claytonia perfoliata*) is grown in France as a salad, and for cooking like spinach.

Pursuivant, third and lowest rank of heralds. Formerly P.s were attendant upon the heralds, from whom they learnt their craft, and many of the great nobles had their own P.s, who were often named after the armorial bearings of their masters. To-day the 4 P.s of the College of Heralds (q.v.) (Rouge Dragon, Rouge Croix, Bleu-mantle, and Porteuille) have virtually the same functions as heralds.

Purus: 1. Riv. of S. America. It is a trib. of the Amazon, rising in E. Peru, and receives the Acre, joining the Amazon

110 m. above Manaus. It is 1900 m. long and navigable for 1600 m.

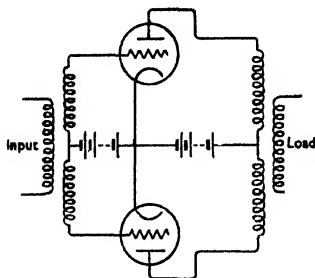
2. Tribe of Brazilian Indians occupying the lower course of the R. P. They are of nomadic habits and live in temporary huts erected on swampy is.

Purveyance, see PRE-EMPTION.

Pusan, see FUSAN.

Pusey, Edward Bouverie (1800-82), cleric, b. Pusey, Berkshire, his father, the Hon. Philip Bouverie, having taken the name of P. on his succession to the P. estates. He was educ. at Eton and Christ Church, Oxford, and in 1824 was elected a fellow of Oriel. He then went to Germany, where he studied oriental languages and theology and also Ger. rationalism, the introduction of which into England he greatly feared. In 1828 he became regius professor of Hebrew at Oxford. It was with the object of stemming the rising tide of rationalism that he joined Newman in the issue of *Tracts for the Times* soon after their inception (1833) and became one of the leaders of the Oxford Movement (q.v.). In 1836 he commenced the Oxford Library of the Fathers, a series of trans. of the works of the early writers. It was P.'s influence that prevented the results of Newman's secession to Rome from being greater than they were and that mitigated in some degree the effects of the Gorham Judgment in 1850, which also led to secessions to Rome. P. House, Oxford, a theological centre, is a memorial to P.'s life and work. See lives by H. P. Liddon, 1893-7; and L. Prestige, 1933.

Push-Pull Amplifiers consist of 2 amplifier valves whose grids are supplied with equal voltages in phase-opposition, the outputs being combined by a transformer with a tapping at the middle. As the



currents in the 2 halves of the output transformers are equal and opposite, there is no d.c. magnetisation. There is less distortion than with a single amplifier, and no 'hum' in the output.

Pushball, game played with a large ball, 6 ft. in diameter and weighing about 50 lb. It consists of pushing the ball under, or heaving it over, the bar of a goal, raised on posts 7 ft from the ground.

The former achievement gains 5 points, the latter 8 points. The team consists of 8 or 11 a side, and the playing field is generally about 150 x 60 yds in size. The game may also be played on horseback. P. originated in the U.S.A.

Pushkar, a lake 7 m. W. of Ajmer, in Rajasthan, India, which is of great sanctity. It is the scene of a large ann. pilgrimage, and among the temples is one to Brahma, said to be the only one so dedicated in India.

Pushkin, Aleksandr Sergeyevich (1799-1837), greatest Russian poet and one of the greatest figures in world literature, descended from an old noble family and on his mother's side from Gen. A. Gannibal, an Ethiopian. He received an excellent education and held sinecures at the Foreign Office, 1817-24, and at the court from 1834. P. was brought up on the ideas of the Enlightenment and the Fr. Revolution, and in his youth stood close to the Decembrists (q.v.), many of whom were his personal friends. For his revolutionary and atheistic utterances he was twice banished—to New Russia (q.v.) in 1820 (the banishment being disguised as a transfer) and to a family estate in 1824. Later he abandoned his revolutionary enthusiasm and his toying with atheism, and was a liberal and a sincere Christian. He was too proud and independent for the court *camarilla* to tolerate him in their midst, and although he was on good terms with Nicholas I (who exempted him from ordinary censorship and was himself his censor) he was constantly a target for intrigues which finally led to a duel in which he was mortally wounded. P. began writing poetry as a boy, his first poem being pub. when he was 15. His early lyric poetry was influenced by Voltaire, Parny, Anacreon, and by Russian Classicists (Derzhavin, q.v.) and Romantics (Zhukovskiy, q.v.). In the 1820's he was strongly influenced by Lord Byron, then discarded Romanticism and laid the foundations of Realism in Russian literature. Apart from many lyrical poems P. wrote long poems—romantic (*Ruslan and Lyudmila*, 1819, and the Byronic *Caucasian Prisoner*, 1821; *Fountain of Bakhchisaray*, 1822, *Gipsies*, 1824), historical (*Pollava*, 1828), and philosophical (*The Bronze Horseman*, 1833); plays in the Shakespearian vein (*Boris Godunov*, 1825); short and long stories (*Belkin's Tales*, 1830, *The Queen of Spades*, 1834, *Dubrovskiy*, 1834, *Captain's Daughter*; 1836); fairy-tales in verse, etc. His *chef-d'oeuvre* is the 'novel in verse' *Eugene Onegin* (1823-31), often called an encyclopaedia of Russian life of the period. In his works P. set the norms of the modern Russian literary language. He is universally recognised by Russians as the greatest national genius.

Pushkin (before 1917 *Tsar'skoye Selo*, until 1937 *Detskoye Selo*), tn in Leningrad Oblast, 15 m. S. of Leningrad. It has famous 18th-cent. imperial palaces and parks and interesting 19th-cent. buildings. There is a Pushkin memorial museum.

P. was founded in 1718. The first Russian railway ran from St Petersburg to P. in 1837. Pop. (1926) 24,500.

Pushtoonistan, *see* NORTH-WEST FRONTIER.

Pushtu, also known as Pashto, Pakhto, Pakkhto, etc., the vernacular of the tribe of Pukhtus or Pathans in E. Afghanistan; it is also spoken in Baluchistan. P. is an E. Iranian language. The official language of Afghanistan is Persian (the Persian-speaking Afghans are known as Parsiwans), which is mainly spoken in W. Afghanistan. In N. Afghanistan Turkish is widely used.

Pustule, small elevation of the epidermis filled with pus or lymph. A papule (q.v.) may, when infected, become a pustule. *See* RASH.

P'u Sung-ling, *see* CHINESE LITERATURE.

Puszta, *see* ALFOLD and HORTOBÁGY.

Puteoli, *see* POZZUOLI.

Putnam, George Palmer (1814-72), Amer. founder, 1838, of the publishing firm which bears his name both in New York and London.

Putnam, George Palmer (1887-1950), Amer. author and publisher, b. Ite, New York, a grandson of the founder of Putnam's publishing house. Educ. at Harvard and the Univ. of California, he was 4 times married, his third wife being Amelia Earhart, the airwoman, with whom he collaborated in *Last Flight*, 1938. Others of his books are *In the Oregon Country*, 1918, *Soaring Wings*, 1939, *Duration*, 1943, and *Wide Margins: a Publisher's Autobiography*, 1942.

Putney, riverside suburb of London, in the bor. of Wandsworth. It is a centre of rowing clubs, and the Oxford and Cambridge boat race starts from here. The par. church has fine 16th-cent. fan vaulting in the chantry chapel of Bishop West. In this church a council of war was held by parliamentary gens. in 1647. Swinburne lived for many years in P. P. Heath, once a resort of highwaymen, is 1 m. S.

Putrefaction, decomposition and decay of animal and vegetable matter. Chemical change is brought about by bacteria, ptomaines being formed and malodorous gases given off. Decay is prevented, as shown by Pasteur, if the organic matter is sterilised and kept free from bacteria by hermetic sealing and the like.

Putrid Sea, *see* AZOV, SEA OF.

Putsch, Ger.-Swiss word, meaning thrust or push, and originally used colloquially of a shower. Since the 20th cent. it has acquired an international meaning as an unexpected revolt of limited size and duration, aiming at an overthrow of the existing gov. by force. The most famous P. was the 'Munich beer-cellar P.' of Adolf Hitler and his followers in 1923. Other P.s include the overthrow of Stambolsky's dictatorship in Bulgaria in 1923 and the ousting of the Khaled al-Azm Gov. in Syria by Marshal Zaim on 30 Mar. 1949, followed by his own assassination in Aug. 1949 in Gen. Hinnawi's counter-P. There have been frequent P.s in S. and Central Amer. countries.

Putting the Weight, or Shot, sport of great antiquity which later came to be played with a cannon-ball or shot, classified as a 'weight', i.e. 16 lb. The putting area of a 7-ft square was in 1908 changed to a 7-ft circle, edged in front with a toe-board, 4 in. high, the inside of which checks the putter's foot. The shot is held below the right ear, and the putter, balancing on his right leg, executes a sideways hop, landing near the centre of the circle on his right foot; the left leg follows through and is placed near the toe-board. The right leg bends; then both legs straighten; the shoulders are squared and the shot is delivered by straightening the right arm. A 'reverse' movement keeps the putter inside the circle. Parry O'Brien (U.S.A.) made a science of this sport, and in 1954 became the first man to achieve a putt of more than 60 ft. In 1956 he raised the world record to 63 ft 2 in. He won Olympic (q.v.) titles for the event in 1952 and 1956. *See* ATHLETICS.

Putty, *see* GLAZING.

Putty Powder, dioxide of tin, prepared from the soum or crude oxide formed on the surface of melted tin. This is removed, purified by calcination, and used as a polishing powder and for making white enamel and opal glass.

Putumayo (riv.), *see* ICA.

Putumayo, commissary of Colombia, occupying the drainage basin of the P. R. The cap. is Mocoa. Attention was drawn to the Peruvian rubber-growing districts of the P., by the reports of atrocities committed upon the native Indians employed by an Anglo-Peruvian company in the collection of rubber. The Brit. consul at Rio, Sir Roger Casement (q.v.), was sent to investigate, and reported in 1912, bearing out the truth of the reports. The Peruvian Gov. instituted reforms and estab. a commission to punish offenders. Area 10,220 sq. m. Pop. 15,800. *See* W. E. Hardenburg, *The Putumayo, the Devil's Paradise*, 1912.

Puvis de Chavannes, Pierre Cécile (1824-98), Fr. painter, b. Lyons. He was educ. at the Lyons College. Henri Scheffer was his first master, and then Couture. In 1852 he estab. a studio for himself and organised an academy for his fellow students. He first exhibited in the Salon in 1850, but he did not attract serious attention until 1862, when he produced 'Peace' and 'War', which were acquired by the State. These 2, with 4 panels, are in the great gallery of the museum at Amiens. In Paris he decorated the Panthéon, the Hotel de Ville, and the amphitheatre of the Sorbonne. His work became grand and serene in style, and perfect in its proportions, simplicity, and delicacy of colour. He developed an entirely new style of wall-painting technically, oil paint on canvas which was cemented to the wall. Among his pupils were Ary Renan, Baudouin, and Cottet. *See* lives by R. Jean, 1914, and C. Maclair, 1928.

Puy-de-Dôme, dept. of central France. Plateau and mts occupy three-fourths of

it, plain and valley the rest. Branches of the Cévennes and of the Auvergne Mts overspread the E. and W. of the dept. The multitude of conical hills or *puy*s, of basaltic and lava masses, and of craters, shows the volcanic nature of the soil. The prin. riv. is the Allier. The soil is, in general, light and poor; but the splendid valley of Limagne is fertile throughout and well cultivated. The climate is uncertain; the mts are often visited by severe storms, and more or less covered with snow for 6 or 7 months of the year. The chief products are wheat, rye, flax, fruits. The high pasture lands support large numbers of cattle,

usually streptococci and staphylococci. It differs from *septicaemia*, the general term for invasion of the blood by microbes, in the formation of metastatic or secondary abscesses. It is caused by the germs from an acute primary abscess shedding emboli, or particles of fibrin, which are carried along in the blood-stream; where these emboli lodge a metastatic abscess is formed, which is more or less dangerous according to its situation. The treatment consists in surgical drainage of any abscesses which may form and giving the appropriate antibiotic or sulphonamide, or both.

Pyandzh, see AMU DAR'YA.



D. McLeish

THE VOLCANIC ROCKS OF LE PUY, PUY-DE-DÔME

The nearer, 280 ft high, is crowned by the church of St Michel d'Aiguille dating from 962. The farther, 435 ft high, is surmounted by a gilded statue of the Virgin and Child composed of the metal of over 200 Russian cannon taken at Sevastopol.

sheep, and goats. The prin. minerals are iron, antimony, and lead. There are sev. hot and cold mineral springs; among the most frequented are those of St Myon and Chateldon. The prin. tns are Clermont-Ferrand (the cap.), Ambert, Issoire, Riom, and Thiers (qq.v.). Area 3,090 sq. m. Pop. 481,400.

Pu-yi, see HSÜAN T'UNG.

Puzzle, see RIDDLE.

Pwllheli, seaport, municipal bor., and mrkt tn of Caernarvonshire, Wales, on Cardigan Bay, 21 m. SSW. of Caernarvon. There is a small fishing fleet. Copper, manganese, and lead are found in the neighbourhood. P. became a bor. in the 13th cent. Pop. 4300.

Pyæmia (*puon*, pus; *haima*, blood), disease due to the presence in the blood of pyogenic or pus-forming micro-organisms,

Pyapon, dist. and tn of Burma, in the Irrawaddy div. Rice is grown. Pop. (dist.) 387,000; (tn) 11,000.

Pyatigorsk, tn in the Stavropol' Kray of N. Caucasus, 90 m. SE. of Stavropol', in the mineral waters group of spas. It is a large health resort and also a local cultural centre. P. was founded in 1780, and has been a spa since 1803. Pop. (1956) 69,000.

Pycnogonidae, or Pantopoda, small marine group of the Arthropods found in large numbers in deep waters, and to a certain extent on the foreshore. The class includes numerous families. The commonest species is the *Pycnogonum littorale*, or common sea-spider, with 4 pairs of 8-jointed legs. It is found under stones at low water, but is often found clinging to an anemone in ouse-like

fashion. The largest form is the *Colosendeis gigas*, which measures nearly 2 ft from tip to tip of its legs. This form is found only in the deep seas.

Pydna, anct tn of Macedonia, near the Thracian Gulf. Originally a colony from Euboea, it was conquered by Philip of Macedon, 356 BC. It was the site of a Rom. victory over Perseus, last King of Macedonia, in 168 BC.

Pyelitis, inflammation of the renal pelvis, i.e. the expanded upper portion of the ureter where it is attached to the kidney. Infection may occur either from the blood-stream or ascend from the bladder; the infecting organism is usually *Bacillus coli*, but it may be a streptococcus or staphylococcus or tuberculous. The attack is acute at first, but may become chronic later. The symptoms of acute P. are abdominal pain, especially near the kidney; scanty deep-coloured urine, from which the bacteria can be cultured, and having a characteristic fishy odour; high temp. and other generalised symptoms. Urinary antiseptics, such as hexamine, and also the sulphonamides and the antibiotics, are used in the treatment of P.; the urine should be maintained alkaline in reaction and ample fluids given. The chronic form is liable to persist for a long period. P. is sometimes a complication of pregnancy.

Pyeng-yang, cap. of N. Korea and of Pyŏng-yang Prov., on the Ta-tong R., 36 m. from its mouth. It is said to date from 1122 BC, and was the scene of great battles between the Chinese and Japanese in 1592 and 1894. During the Korean War (1950-3) it was almost completely destroyed, but has since been rebuilt. Pop. approx. 500,000.

Pyeshkov, see GOR'KII.

Pygmalion, 1. King of Cyprus, son of Clix and grandson of Agenor, fell in love with an ivory girl he had made, and Aphrodite breathed life into her. By her P. was the father of Paphos. See GALATEA.

2. Son of Belus and brother of Dido.

Pygmies, races of dwarf men whose average height is 57 in. for the men and 54 in. for the women. The cause of their small stature is not known. The Negrillos, P. of the Congo forest, are probably a branch of the Negro stock which separated at a remote period; the Negritos, P. of Malaya, the Philippines, New Guinea, and the Andaman Is., are probably akin to the Papuans.

P. have been known since the 3rd millennium BC when the Pharaohs sent S. for P. to dance before them (see also DWARFS).

In Africa they live mainly in the dense forest of the Congo basin, chiefly in the Ituri forests. Their skin is a reddish-brown or darker, their noses broad and flat, and their faces generally prognathous. They hunt with bows and poisoned arrows, trap game, and collect fruit. For cultivated produce such as maize the Congo P. rely on exchange with their Bantu neighbours who will accept their game. They live in small groups

and belong to totemic clans, which are generally exogamous. All the P. believe in a power associated with the firmament, the 'Lord of the Hurricane,' etc., and offerings of slain beasts and honey are made.

The Negritos are of similar physical type. They also are hunters, except for the New Guinea group, who are vegetarians. In the Malay peninsula they use the blow-pipe and poisoned darts instead of the bow for hunting. On the Philippines there are sev. different groups, of which the best known are the Aeta. In New Guinea they live in small groups, in vils. administered by a headman and elders.

P. are polygamous, and divorce is common. A divorced woman can be recognised because the top joint of her first finger has been removed. Of their religion little is known. It is even uncertain whether they are totemic or not. They believe in spirits in rocks, trees, etc., but beyond that nothing definite can be said.

Little is known of their languages, which in most cases have been considerably influenced by those of their non-pygmy neighbours.

See A. R. Radcliffe-Brown, *The Andaman Islanders*, 1922; C. G. Seligman, *Races of Africa*, 1930; P. Schöbsta, *Among the Congo Pygmies* (trans. G. Griffin), 1932, *My Pygmy Hosts*, 1936; and *Revisiting my Pygmy Hosts*, 1936; R. P. Trilles, *Pygmies de la forêt équatoriale*, 1932; and I. H. N. Evans, *Negritos of Malaya*, 1937.

Pylades, son of Strophios of Phocis, nephew of Agamemnon, and close friend of Orestes (q.v.). He helped him avenge his father and married his sister, Elektra.

Pylos, see THERMOPYLAE.

Pylos, 1. (Gk *pylōn*, gateway), in anct Egyptian temples, an enormous stone gateway or frontispiece with battered sides (see BATTER) forming the entrance, and decorated with sculpture and hieroglyphics in low relief. There are many fine examples, e.g. at Edfu, Karnak, etc.

2. Tower of lattice steel construction carrying overhead electric transmission lines in open country. The steelwork is supported on concrete foundations and protected by galvanising. The minimum clearance between the live wires and any part of the steelwork is 3 ft 6 in. The standard single-circuit tower, type S₁, is 66 ft 3 in. high and 15 ft in breadth; the standard double-circuit, type D₁, is 78 ft 3 in. high and 18 ft 6 in. broad; both single and double have a cable span of 900 ft. The highest towers in the country are the double-circuit towers used for the Thames crossing at Dagenham; they are 487 ft high, with a cable span of 3060 ft; power is transmitted at 132,000 volts (being reduced to lower voltages in the areas where it is to be used). The suspension towers over the Forth are 338 ft high, with a cable span of 3050 ft.

Pylosic Stenosis, see STOMACH.

Pylos (modern Navarino), anct tn on the W. coast of Messenia, Greece. It has

been identified with the home of Neleus and Nestor. It was prominent during the Peloponnesian war, fortified by the Athenians in 425 B.C. and retained by them till its recapture by the Spartans in 409 B.C. There are important Mycenaean remains, and tablets inscribed with the Minoan script have been found here. See also NAVARINO.

Pym, John (1584-1643), statesman, b. Brymore, Somerset. He studied at Broadgates Hall (later Pembroke College), Oxford, and at the Inner Temple. He entered Parliament in 1614, and in a few years became one of the leading speakers in the House of Commons. He was a manager of Buckingham's impeachment (1626), a supporter of the Petition of Right (1628), and a vigorous opponent of the tonnage and poundage scheme (1629). He gradually became one of the most effective leaders against the gov.'s oppressive measures, and in 1640 was intimately associated with the impeachment of Strafford and Laud. He was amongst those who prepared the Grand Remonstrance (1641), and was one of the 5 members whom Charles I. came in person to Westminster to arrest (1642). It was P. who secured the Scots alliance. He was the most powerful man on the parl. side when war broke out. A great parliamentarian and an efficient organiser P.'s personal character is somewhat marred by his unscrupulous attack on Strafford, his former friend, during the attempt to impeach Strafford. See life by S. R. Brett, 1943.

Pyorrhoea Alveolaris, inflammation of the dental periosteum, causing a discharge of pus from the tooth sockets when in an advanced stage. The symptoms are swelling of the gums, which discolour to bluish, their softness, looseness, and inclination to bleed. The teeth loosen as the disease develops, and when far advanced may fall out. The pus may be swallowed with the food, or toxins may be carried in the blood and affect other parts. Neglect of dental hygiene is the cause of P. A. Treatment can be performed only by dentists, and when P. A. is advanced entails tooth extraction. *Gingivitis*, or inflammation of the gum margins, is a milder condition than P. A., and there is no discharge of pus.

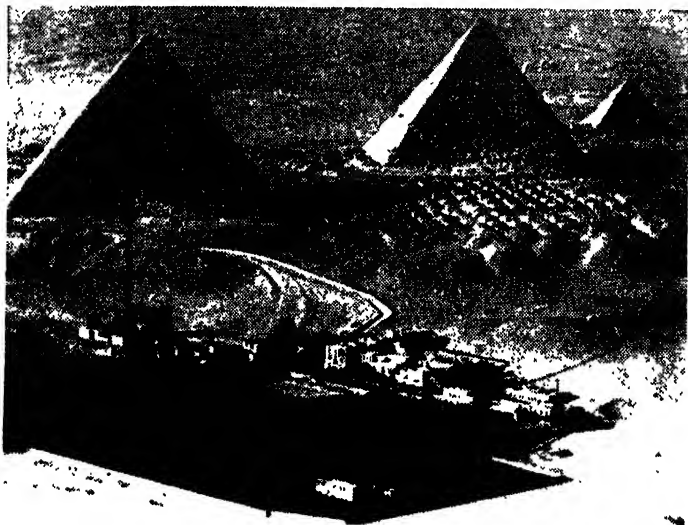
Pyraecantha, a genus of about 7 thorny evergreen shrubs, family Rosaceae; *P. coccinea*, Firethorn, and its varieties, of Asia Minor, and *P. rogersiana*, China, are typical, and much grown in gardens for their berrying beauty.

Pyramid, as a geometrical figure has a polygonal or square base with triangular sides sloping to an apex. As a stone structure on a square base the P. belongs peculiarly to Egypt. From the 3rd to the 12th dynasties, royal tombs there were usually in the form of P.s with a complex of buildings in which rituals were performed to prepare the dead king for his after-life in the sky in association with the sun-god. The Egyptian name for the P. probably means 'place of ascent'; and the development of the P.

from the mastaba, the royal tomb of the first 2 dynasties, may be seen at Sakkara in the Step P. of Zoser, first king of the 3rd dynasty, the oldest stone building in the world, devised after several changes of plan by Imhotep the king's vizier. Perhaps the most remarkable architectural work of Egypt, it was surrounded with a greater array of buildings than any other P. Zoser was apparently buried in a granite chamber under the P., where there were also many passages in which thousands of beautiful stone vessels were found. The idea behind the mastaba form of tomb, which copied in brickwork the palace of timber and rush-work, was that the dead king lived in his tomb in the earth; the new idea behind the P. was that it was a staircase to the sky by which the king ascended to the realm of the sun-god. The P.s of the other kings of the 3rd dynasty are all so ruined that it is uncertain whether some of them were ever finished or not. One at Sakkara is being examined at present. Seneferu, the first king of the 4th dynasty, built 2 P.s, that at Meidum, begun as a Step P. and finished as a true P., and the 'Bent P.' at Dahshur, S. of Sakkara, hastily completed (although it was the first P. planned throughout as a true P.). A few miles from Cairo on the W. of the Nile are the 3 great P.s of Giza, of world-wide fame. The greatest is that of Khufu or Cheops, son of Seneferu. Each side of its base measures 455 ft. and is oriented in line with the points of the compass. When complete it was 481 ft. high, but the top 31 ft. are now missing. It covers 13 ac. of ground. The stone blocks of the core were hewn from the surface of the Giza plateau; and it was faced with blocks of fine limestone brought from Tura across the Nile. All this outer facing, except for a few blocks at the base, has been stripped, leaving a series of great steps formed by the courses of stone, and rendering the ascent easy but fatiguing. About 12 courses and the capstone are missing from the top. The entrance was about 55 ft. up on the N. side and led to 3 chambers, one in the rock and 2 in the body of the P. In the upper chamber, built of granite, was found a rectangular granite sarcophagus. Situated on slightly higher ground, the P. of Khufu's successor, Kha-f-Ra, or Chephren, is now 2½ ft. lower than his, and was originally 10 ft. lower, the dimensions at the base being 48 ft. less. This P. has a considerable portion of the Tura casing surviving at the top, and some of the polished granite facing of the bottom course. It has 2 entrances on the N. side leading to a single chamber in the P., in which was found a polished granite sarcophagus. On the E. side of Chephren's P. is a complex of funerary buildings, the first recognisable example of the standard lay-out. From the 'valley building' faced with polished granite and remarkably well preserved, situated near the limit of the flood-plain, the foundation of a ½-m.-long stone causeway once roofed over and decorated with reliefs leads to the mortuary temple on the

E. face of the P. The royal corpse underwent ceremonies of purification in the valley building. At the centre of the mortuary temple were 5 niches for statues of the king, and close outside it on either side were 5 boat-shaped pits that once contained wooden boats. Recently 2 pits still containing boats (bringing the boat-pits of Cheops also up to 5) were discovered near the Great P. The number 5 may be connected with the 5 official names of the king, the fifth 'Son of Ra' name being added about this time, and Kha-f-Ra being the first king to have

spells going back to prehistoric times, aimed at ensuring the king a safe journey to the sky and his association with the sun-god. It was probably in the period of anarchy following the 6th dynasty that the P.s were first robbed. The 11th (Theban) dynasty was the first to reunite Egypt. Neb-hepet-Ra Mentu-hotep built at Deir el Bahri a remarkable funerary temple, the central feature of which was a P., although his tomb was in the cliff behind. The 12th dynasty (also of Theban origin) moved their H.Q. to near Lisht, where Amenemhat I and Senusret



THE PYRAMIDS OF GIZAH

E.N.A.

The Mena House Hotel is in the foreground.

a name including that of Ra, indicating the rising importance of the cult of that sun-god. As Ra was believed to cross the sky in a boat, the king was thought to need boats for his journeys in the sky. The 3rd P. at Giza is that of Men-kau-Ra, the Mykerinos of the Greeks, who must have died prematurely, for the buildings of his P. complex were hastily completed in brick. The P. covers less than half the area of the Great P. In it was found a fine panelled basalt sarcophagus, lost at sea on its way to Europe. The kings of the 5th dynasty founded by the priests of Ra at Heliopolis built P.s inferior in size and quality to those of their predecessors, and the 6th dynasty continued the practice. The P.s of Unas, last king of the 5th dynasty, and of the kings of the 6th dynasty, are important for the Pyramid Texts, magic

I constructed their tombs with more or less standard P. complex. Around the main P. of Senusret I are 9 small P.s belonging to members of the royal family. Three of their successors built P.s at Dahshur, in one of which was found the Dahshur Treasure of wonderful gold-work now in the Cairo Museum. Senusret II built his P. at Illahun, where, in the tomb of one of his princesses, was found another equally remarkable treasure, mostly now in the Metropolitan Museum, New York. Amenemhat III built 2 P.s, one at Dahshur and the other with a labyrinthine temple at Hawara. With the next dynasty, from which 1 or 2 small P.s are known, the Middle Kingdom came to an end. After another period of anarchy and conquest by foreigners the New Kingdom arose, whose kings abandoned the construction of P.s for

royal tombs; and this practice was only resumed by the 25th (Cushite) dynasty from the Sudan, who conquered Egypt in the 7th cent. BC and started the archaizing movement usually attributed to their successors the 26th (Saite) dynasty. Their P.s and those of their successors for a thousand years are in the Sudan at Kurru, Nuri, and Barkal in Dongola (ancient Napata) and at Meroe near Shendi. The last P.s there, dating from the 3rd-4th cent. AD, are tiny erections of brick. For problems connected with the construction of the great stone P.s see S. Clarke and R. Engelbach, *Ancient Egyptian Masonry*, 1930. The most advanced tools used were only copper saws and copper tubular drills with quartz sand abrasive; and the raising of large stone blocks was done by sleds and earth ramps.

Various ancient structures, found throughout Mexico, include P.s, and many of these are at Teocuitatlan, where the great earth P.s of the sun and moon are situated. They are mere mounds of earth, of which much of the pyramidal form has gone with the action of time. The sun P. is some 700 ft on each side of the base and rises about 200 ft. There is evidence of staircases and terraces, and it is thought that they were once crowned with temples (see ZIGGURAT).

See also I.E.S. Edwards, *The Pyramids of Egypt*, 1947; L. V. Grinsell, *Egyptian Pyramids*, 1947; *Herodotus I* (J. E. Powell's trans., 2 vols., 1949).

Pyramids (game), see BILLIARDS.

Pyramus and Thisbe. Ovid (*Metam.* iv. 55-465) tells how P., a Babylonian youth, loved T. They were to meet under a certain mulberry-tree by the tomb of Ninus and elope together. T. arrived first, but was terrified by a lioness (which had just killed an ox) and ran away, dropping her veil, which the lioness tore to pieces with its blood-stained jaws. P. found it, and thinking T. was dead slew himself. She returned and killed herself upon his corpse. The fruit of the mulberry afterwards became red instead of white.

Pyrenean Dog (*Chien-berger des Pyrénées*), small sheep-dog, originating in the Pyrenees, standing about 18 in. high. The P. D. is intelligent and agile, with long, wavy, sandy hair, and proves an excellent sheep-dog in mountainous regions.

Pyrenées, Basses-, dept of France on the Sp. frontier, formed of the ancient prov. of Béarn and part of Gascony. It is watered by the Adour, which is fed by many mountain torrents called 'gaves.' In the S. are the peaks of the W. Pyrenees, giving way to the wooded hills, the heathland, and the fertile valleys of the Basque country, and to the plateau of the NE. The dept is heavily forested, and there is much good pasture. Wheat, maize, and vines are produced, and mules, horses, sheep, and pigs are raised. Fishing is important, and there are hydro-electric installations. The tourist industry is well developed, and there are numerous spas. The prin-

ts are Pau (the cap.), Bayonne, and Oloron (qq.v.). Area 2978 sq. m. Pop. 420,000.

Pyrenées, Hautes-, dept of France on the Sp. frontier, formed from parts of Gascony, including Bigorre (qq.v.). The S. part is very mountainous, containing ramifications of the Pyrenees, with the peaks of Vignemale (10,820 ft), Pic de Néouville (10,145 ft), and Pic du Midi de Bigorre (9440 ft). Between the spurs are picturesque valleys, fertile in the lower parts. The hills gradually descend to a plain in the N. In the NE. lies the desolate plateau of Lannemezan. The chief riv. is the Adour, with its tribs. the Arros and Gave de Pau. The Garonne is on the SE frontier. There is much forest land, and wheat, maize, vines, tobacco, flax, and chestnuts are grown. Marble and slate are quarried and lignite, zinc, manganese, and lead are found. There are mineral springs, and flour, saw, and paper mills, etc., in the dept. The prin. ts are Tarbes (the cap.), Argelès-Gazost, and Bagnères-de-Bigorre (qq.v.). Area 1750 sq. m. Pop. 203,550.

Pyrenees, Peace of the, treaty arranged between France and Spain on an is. of the Bidassoa in Nov. 1659. The chief terms were the cession to France of most of Artois, parts of Flanders, Hainault, and Luxembourg, Roussillon and Cerdagne, Pineroles, Clermont, Stenay, and the duchy of Bar; and a marriage was arranged between Louis XIV and the Infanta of Spain, Maria Theresa.

Pyrenees, The, after the Alps, the grandest mt system of Europe. Stretching for some 250 m. from the Bay of Biscay to Cape Creus, they rise as a formidable barrier between France and Spain. Both to N. and S. their ridges present a regular terrace-formation, and are truly saw-like. The loftiest heights, including Néthou or Aneto (11,170 ft), Posets (11,047 ft), Mont-Perdu (11,000 ft), and Vignemale, are all in the central range. Precipitation is much greater on the Atlantic side, which accounts for the wooded scenery there. In the E., bare granite masses tower above vineyards, and olive groves, tamarisks, and aloes remind one of the proximity of Africa. The P. were mined in the times of the Carthaginians and Romans, and copper, silver, coal, lignite, lead, and iron are still found. The P. have only a few passes. Beyond the I. Perthus (950 ft), which extends from Figueras to Perpignan, the Col de Somport or the Pot de Canfranc (3355 ft), along which wound the old Rom. road from Saragossa to Oloron, and the Col de la Perche (5280 ft) between the valleys of the Tet and Segre, there are only foot- and bridle-paths. No rivs. of size, except the Garonne, find their source in the P. There are no lakes to rival Lucerne, etc. The caverns of the P. are of great interest to speleologists; the largest group explored so far is clustered around the source of the R. Garonne, near the ts of St Gaudens and St Martory. The deepest cavern explored in the P. to date is the Gouffre de la Pierre St-Martin (2380 ft) in

the Basses-Pyrénées (see N. Casteret, *The Descent of Pierre Saint-Martin*, Eng. trans. 1955). Again and again the inaccessibility of the P. has made them a secure retreat; it was here that the Christian refugees made a last stand against the Moors. Within the range lies the republic of Andorra. See Count H. Russell, *Etarrits and the Basque Countries*, 1876; E. E. Bilborough, *Twice France and Spain*, 1883; H. Belloc, *The Pyrenees*, 1909; C. L. Freeston, *The Passes of the Pyrenees*, 1913; V. C. Scott O'Connor, *Travels in the Pyrenees*, 1913; C. Schuster, *Men, Women and Mountains*, 1931; V. Alford, *Pyrenean Festivals*, 1937; P. Arqué, *Géographie des Pyrénées françaises*, 1943.

Pyrenées-Orientales, dept. of S. France, formed of the ant. prov. of Roussillon, and of part of Languedoc. It contains the W. end of the Pyrenées, and is extremely mountainous, except for the plain of Roussillon in the E. The chief rvs. are the Têt and the Tech. Vines, olives, vegetables, and fruit are produced, and livestock is raised. There are metallurgical and chemical industries, and hydro-electric installations. The princ. towns are Perpignan (the cap.), Céret, and Prades (qq.v.). Area 1598 sq. m. Pop. 230,300.

Pyrenomycetes, the Flask Fungi, a sub-class of Ascomycetes, characterised by flask-shaped fructifications, which either open at top to liberate the spores or else decay. Some species are parasitic on plants, others on insect larvae, and some are saprophytes. *Claviceps purpurea* is the cause of the disease known as ergot of rye; *Cordyceps* attacks certain caterpillars. *Eurotium aspergillus* is the greenish mould which attacks jam.

Pyrethrum: 1. The P. of gardens is *Chrysanthemum coccineum*, of SW. Asia, cultivated in variety for its large flower heads in various colours and much-dissected fine foliage.

2. Insecticide, made from the powdered heads of *Chrysanthemum cinerariifolium* and *C. roseum*, or as an extract. Valuable for its non-poisonous nature, and quick 'knock-down' effect on many insect pests of the garden and home.

Pyrexia, see FEVER.

Pyrgi, ant. tn of Etruria, Italy. It was the port of Caere. Stormed by Dionysius of Syracuse, 387 bc, it became subject to Rome about 290 bc.

Pyrgos, tn in the dept. of Elis, Greece, 40 m. SW. of Patras, with a port at Katakolon. Near it are the ruins of Olympia. Pop. 19,000.

Pyrheliometer, instrument for measuring intensity of solar radiation. In Ångström's P., devised in 1896, 2 thin similar platinum strips, of known area, have each a thermoelectric junction fixed to the rear for determining their temps. One strip is blackened and exposed to the sun and a measured current of electricity is passed through the other, and equality of temp. is indicated by a galvanometer connected with the thermal junctions. When this occurs it is assumed that the

amount of heat introduced by the electric current is the same as that absorbed by the strip exposed to the rays of the sun. Knowing the former the latter can be determined. The solar constant (q.v.) is given in calories per sq. cm. per min. More modern forms of P.s have been devised to obviate constant errors. See C. G. Abbott, *The Smithsonian Standard Pyrheliometry*, Smithsonian, Misc. Coll., Washington, Vol. 110, No. 11, 1948.

Pyridine, C₅H₅N, aromatic base found in coal-tar oil (lower-boiling fractions), bone-oil, or bone-tar, from which it is obtained by fractional distillation of the basic portion. It is a colourless mobile liquid (boiling point 116° C.), miscible with water, soluble in alcohol, ether, benzene, etc., and possessing a pungent odour. It is a strong base, forming crystalline salts with acids, but is very stable, and is not attacked by boiling nitric or chromic acids. It forms substitution products with halogens. It is used as a solvent, a denaturant for alcohol, and a catalyst in dye manuf., and in insecticides and fungicides, etc.

Pyrites (FeS₂), disulphide or iron, a commonly occurring mineral of a brassy-yellow colour, which crystallises in the cubic system (hardness 6-6.5). On heating in air it gives off sulphur, and is used in the manuf. of sulphuric acid and the sulphate of iron (copperas) of commerce. P. may contain traces of gold and other metals, the former being profitably extracted from the residues of the 'wet copper' process. Identical in chemical composition and hardness is marcasite. Arsenical P. is the mineral mispickel (Fe(SAs)₂). Pyrrhotine is magnetic P. and is found in hexagonal crystals (hardness 3.5-4) which are paler in colour. Chalcopyrite or copper P. is one of the chief ores of copper, and forms tetragonal brass-yellow crystals which easily tarnish.

Pyritz, see PYRZYCH.

Pyrmont, see WALDECK-PYRMONT.

Pyrocatechin, Pyrocatechol, or Catechol, dihydric phenol known chemically as ortho-dihydroxybenzene. It is prepared by heating phenol-disulphonic acid with alkali, or by heating guaiacol (a solid contained in beech-wood) with hydriodic acid. It is a colourless crystalline solid, melting point 104° C., soluble in water, its solution giving a green coloration with ferric chloride. Its alkaline solution acts as a reducing agent, and as such is used as a photographic developer.

Pyrogallol Acid, or Pyrogallol (C₃H₃(OH)₃), trihydric phenol formed from gallic acid, is a colourless crystalline substance (melting point 132° C.). It is readily soluble in water, the solution turning red with ferric chloride. Its alkaline solution rapidly absorbs oxygen, and becomes black, and for this reason is used in gas analysis. A powerful reducing agent, it is used extensively in photography for developers ('pyro').

Pyrography, see POKER-DRAWINGS.

Pyrola, or Wintergreen, genus of perennial plants (family Ericaceae), with flowers in a bracteate raceme. Four species are

Brit., occurring somewhat rarely in woods in the N. These and others are frequently grown on the rocky and moist borders.

Pyroligneous Acid, crude liquor obtained from the destructive distillation of wood, from which acetic acid, acetone, and methyl alcohol are prepared.

Pyromancy, see DIVINATION.

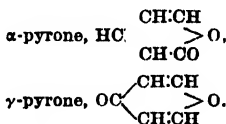
Pyro-metallurgy, see METALLURGY.

Pyrometer, instrument for the measurement of high temps. For rough measurements of high temps. in commercial work sev. forms of discontinuous thermoscopes were formerly used. Wedgwood, for example, utilised the shrinkage of clay rods in testing furnaces for the manuf. of pottery, whilst Seger's cones of clay are still used in some porcelain and brick works. These cones are made of specially blended clays that soften at definite temp. Prinsep designed a series of fusible alloys, each member of which melted at a definite temp. to cover the range from 700° to 1700° C. for furnace work. In modern times it is not only necessary to measure temps. up to 3000° C. in commercial work, but it is also found to be economic to measure temps. scientifically. All temp. measurements are reduced to the absolute or thermodynamic scale and for practical purposes the readings of a hydrogen thermometer approximate very closely to that scale. One of the most widely used types of P. is the *Platinum Resistance P.*, the readings of which can be reduced to the hydrogen scale and therefore to the absolute scale. This P. makes use of the fact that the electrical resistance of a platinum wire increases as its temp. is raised. The instrument is calibrated in the usual way (see THERMOMETER) by finding the resistance of the thermometer at the upper and lower fixed points, and, in order to reduce its readings to the hydrogen scale, a third reading is taken when the thermometer is immersed in vapour from boiling sulphur, i.e. at a temp. 444.55° C. on the hydrogen scale. The platinum wire is enclosed in a special silica case, and it is plunged into the furnace. The electrical resistance is then measured by means of a form of Wheatstone bridge (q.v.) and the temp. of the furnace is deduced. This form of P. may be used for temps. up to 1200° C. and it can measure to 1/100° C. *Thermo-electric P.s* are also very popular, and are made for direct-reading, continuous record work. Their mode of action depends on the fact that when a junction of 2 dissimilar metals is heated, a small electromotive force is generated in the circuit that includes the junction. The e.m.f. varies with the temp. of the junction, and the instrument is used in conjunction with a delicate galvanometer (q.v.). The instrument requires careful calibration, and this is done by the instrument makers. It has the big advantage of being able to measure the temp. at a single point, since the dimensions of the junction are so small that it can be inserted in any small aperture. This convenience makes this type of P. popular

for measuring temps. at different parts of rotating machinery, but they are not used for temps. above about 1000° C.

For temps. between 1200° and 3000° C. *Optical P.s* must be used. These are properly called radiation instruments, since their measurements are based on the radiation emitted from hot bodies. They possess the advantage that it is not necessary to insert them into the furnace, thus exposing them to destructive heat; they are situated at some distance from the furnace, and the radiations from a small aperture in the wall of the furnace are allowed to fall on the instrument. The most common optical P. is of the 'disappearing filament' type, in which a visual comparison is made between a standard electric lamp and the furnace viewed through absorption screens until exact matching is obtained. The temp. of the standard lamp filament is determined from a knowledge of the current supplied to it. Fery has designed a P. that is based on the fact that the radiation from a 'black body' (see RADIATION) varies directly as the fourth power of its absolute temp. (q.v.). In this instrument the radiation falls on a delicate thermojunction and the e.m.f. generated is recorded by a galvanometer. The galvanometer readings are calibrated to record the temp. directly. See E. Griffiths, *Pyrometers*, 1926; T. Preston, *Theory of Heat*, 1929; H. C. Campbell, *Modern Pyrometry*, 1956; R. Royds, *Measurement and Control of Temperature in Industry*, 1956.

Pyrone, name given in chem. to an important group of compounds, the simplest of which are:



Derivatives of P.s occur in nature, e.g. coumarin, the fragrant constituent of the Tonka bean and of woodruff.

Pyrope, see GARNET.

Pyrosoma, genus of compound *Tunicata*. The colony takes the form of a cylinder closed at one end, and may be of any size from 1 in. to 12 ft long. The individuals are placed with their branchial apertures outward and their atrial apertures towards the central cavity. The colonies are phosphorescent, and move about just below the surface of the sea.

Pyrotechnics, art of making fireworks for amusement, public rejoicing, and, to a growing extent, for utilitarian purposes. A firework consists of a container, or 'case,' charged with a mixture so compounded as to be capable of burning without help from the oxygen of the air. At least one ingredient must contain a readily liberated supply of oxygen. From earliest times this function has been performed by saltpetre (potassium nitrate), but since

the beginning of the 19th cent. potassium chlorate has been increasingly employed. Simple firework mixtures were known in China and the E. from very early times, but it was not until the principle of the gun was devised, in Europe during the 14th cent., that a mixture suitable for use as a propellant came to be known as gunpowder. Pyrotechnic mixtures are of 2 types: those producing force and sparks and those providing flame. The effect of the former takes place outside the case; partly consumed material, in the form of sparks, is thrown out by internal pressure. To this class belong fountains, golden rains, squibs, the well-known rocket, which is driven into the air by the reaction of the internal pressure, and those units which give motion to wheels and similar devices employed in public displays. With flame units the thin paper case is consumed as the mixture burns. These are used for illumination, in the form of Bengal or coloured lights, 'lances,' employed to outline the design in pictorial set-pieces, and in the small stars which form the 'garniture' of aerial fireworks, rockets, and shells. Colours were made possible by the introduction of mixtures containing potassium chlorate and the salts of various metals. In England 5 Nov., 'Guy Fawkes Day,' is the occasion for general private firework celebration; in the U.S.A. 4 July, Independence Day, is similarly observed. Pyrotechnic signals, illuminating and incendiary devices, play a large part in modern warfare. At sea distress rockets and flares, and line-carrying rockets, save many lives. In agriculture insecticide smoke mixtures are recent introductions of great value. See T. L. Davis, *Chemistry of Powder and Explosives*, 1944; G. W. Weingart, *Dictionary and Manual of Pyrotechny*, 1937; and A. St H. Brock, *A History of Fireworks*, 1949.

Pyroxene, name given to a group of minerals which have allied chemical and physical characters. They are silicates of calcium and magnesium with iron, alumina, etc., and crystallise in 2 systems. The monoclinic P.s include augite, diaspase, diopside, coesolite, etc.; the rhombic P.s are enstatite, bronzite, and hypersthene. In colour they are brown or green, ranging to black, and occur in basic igneous rocks. P.s may change to amphiboles by weathering and metamorphism, *in vice versa*. They form a parallel series with the amphiboles, from which they are distinguished by their cleavage angle (P. about 87°, amphiboles about 125°), feeble pleochroism, and high extinction angles.

Pyroxille, or Wood Spirit, brownish inflammable liquid obtained by distilling the product of the dry distillation of wood after the tar has been separated, and the acetic acid removed by neutralising with lime. The liquid contains methyl alcohol, acetone, etc., and is used as a solvent and for 'denaturing' alcohol.

Pyroxylin, lower nitrated cellulose, prepared by the action of nitric acid (18 vols. of concentrated nitric acid and 4

vols. of water) on purified cellulose at 65°C. for 10 min. More usually the cellulose is nitrated in a mixture of sulphuric and nitric acid and an appreciable amount of water according to the nitrogen value required. P. is soluble in a mixture of ether and alcohol, the solution constituting 'collodion' (q.v.), which is used for photographic purposes, etc. P. is also used in cellulose lacquers. See also GUNCOTTON.

Pyroxylin Plastic, see CELLULOSE.

Pyrrha, see DRUCALION.

Pyrrhic Dance, a Spartan war dance.

Pyrrho (c. 360-270 BC), Gk philosopher, b. Elia, founder of the sceptical or Pyrrhonian school, studied under Bryson, and accompanied Anaxarchus on Alexander's expedition. His doctrines are chiefly known through the writings of his pupil, Timon the Sillographer of Philus. His main principle is an utter indifference to dogma. Nothing is real but sensation, and nothing can be denied or affirmed with regard to any assertion, so that the only proper attitude to life is one of imperturbability. See E. Zeller, *Stoics, Epicureans, and Sceptics* (Eng. trans.), 1892; C. Wachsmuth, *De Timone Philiario*, 1859; and L. Robin, *Pyrrho et le scepticisme grec*, 1944.

Pyrrhus: 1. King of Epirus (b. 319 BC). He claimed descent from Achilles' son, the reputed founder of the race of the Molossians. Driven from his kingdom at the instigation of Cassander in 302, he was present at Ipsus in the following year, and in 295 was assisted by Ptolemy I to regain his throne. He aimed at emulating Alexander the Great, and tried to win the throne of Macedon; but though he acquired considerable territory in Macedonia, his brother-in-law, Demetrius, was chosen king. War broke out between them (291); Demetrius was forced to flee (287), but P. was soon superseded by the Macedonian Lysimachus (286). His next famous exploit was aiding the people of Tarentum against Rome (280). His defeat of the consul Laevinus at Heraclea was marked by such heavy losses that the phrase 'a Pyrrhic victory' came to mean a victory almost counterbalanced by misfortune. P.'s minister, Cineas, could not prevail on the Senate to make peace, and after defeating the Romans at Asculum (279) he went to Sicily to aid the Greeks against Carthage. On returning to Italy (275), he was crushed at Beneventum by the consul M. Curius, and forced to retire to Epirus. He made himself master of Macedonia again (273), and fell next year in a riot at Argos. See Plutarch's life; E. Schubert, *Geschichte des Pyrrhus*, 1894; and J. P. Mahaffy, *Alexander's Empire*, 1885.

2. Son of Achilles, see NEOPTOLEMUS.

Pyrrrole, colourless liquid of the formula C_4H_5N , boiling point 130°C. It smells rather like chloroform, and possesses weakly acidic but practically no basic properties. P. occurs in coal-tar and bone-oil, and can be synthesised by passing a mixture of acetylene and

ammonia through a red-hot tube. Among important derivatives of P. are haematin, the red colouring-matter of blood, and chlorophyll, the green colouring-matter of plants. P. vapour turns a pinewood shaving moistened with hydrochloric acid a fiery red, hence its name (Gk *purros* fiery-red).

Pyrus, genus of trees and shrubs (family Rosaceae), commonly known as Pears. Many species formerly under *Pyrus* are now under *Malus*, *Sorbus*, *Chaenomeles*, *Mespilus*, and *Aronia*.

Pyrzyce (Ger. Pyritz), tn in Poland, in Szczecin prov., 25 m. SE. of Szczecin (q.v.). Until 1945 it was in Pomerania (q.v.). It was very severely damaged in the Second World War.

Pythley, vil. in Northants, England, 3 m. S. of Kettering, noted on account of the P. Hunt founded about 1750. See H. O. Nethercote, *The Pythley Hunt*, 1888.

Pythagoras (fl., c. 540-c. 510 BC), Gk philosopher, b. Samos, son of Mnesarchus. About 531 he emigrated to Croton, where he estab. a religious society whose aim was to liberate the soul from corruption of the body by study and the practice of asceticism. A conspiracy of his enemies, however, forced P. to withdraw to Metapontum, where he died. The mass of legend which even in ant. times grew round the name of P. is wholly fanciful. P. wrote nothing, though various works, including the P. theorem of Euclid, were attributed to him. From casual references in later writers it is learnt that his central belief was that of metempsychosis (see PHRECYNKS). Thus the way of life or religion taught by P. was a combination of asceticism and the investigation of nature. P. discovered the numerical ratios which determine the prin. musical intervals, and his school was thus led to interpret the world through number. See J. Burnet, *Early Greek Philosophy* (4th ed.), 1948; W. Jaeger, *Theology of the Early Greek Philosophers*, 1947; J. E. Raven, *Pythagoreans and Eleatics*, 1948.

Pytheas (Gk *Putheas*) of Massalia (Marseilles) (4th cent BC), Gk navigator and astronomer, probably a contemporary of Alexander the Great. He sailed from ant. Gaul to the W. and N. of Europe, visiting Britain and sailing along its E. coast for a considerable distance to the N. He was credited with visiting 'Thule'—the name that was given to the groups of the Orkneys and Shetlands—but this view is no longer accepted, and it is believed that his knowledge of these is. was merely derived from hearsay; and on another voyage journeying from Cadiz to the Tanais (Don, or perhaps the Elbe!). He is traditionally supposed to have been the first to connect the spring tides with the phases of the moon, and it is certain that he made astronomical observations for determining latitudes. Only fragments of his *Ocean and Periplos* are extant. See A. A. Arvedson's ed., 1834; M. Fuhr's, 1834-5; M. Cary and E. Warmington, *Ancient Explorers*, 1929;

and G. E. Broche, *Pytheas le Massiliote*, 1936.

Pythia, see DELPHI.

Pythian Games, one of the four great Hellenic festivals, celebrated at Delphi (Pytho) in honour of Apollo. Superintended by the Amphyctlonic Council after 586 BC, these games were held in Aug.-Sept. in the third year of each Olympiad.

Python, oracular serpent produced from the slime of the flood in the time of Deucallion, which lived in the caves of Mt Parnassus and gave oracles at Delphi until slain by Apollo. Apollo founded the Pythian games, and was himself called Pythian, while his oracular priestess at Delphi was called the Pythia.

Python, genus of large non-poisonous snakes, belonging to the family of the Boidae. They are found in most of the tropical parts of the old world, and sometimes reach a length of 30 ft. The *P. reticulatus* is the commonest species in Indo-China and Malay, while farther W. the *P. molurus* is more common. The P.s of Africa are smaller than those of Asia. The smaller P.s feed on small mammals and birds; the larger on mammals of considerable size.

Pyx, small box, generally of precious metal, in which the consecrated Host is reserved or carried to the sick.

Pyx, Trial of the (Lat. *pyxis*, box or chest), final and public weighing and assaying at the Mint of the gold and silver coinage of the realm, by way of public attestation of its standard purity. The first regular public T. of the P., according to Madox, took place as long ago as the reign of Edward I, when the king commanded the Exchequer barons to open the boxes of the assay of London and Canterbury, and make the assay in such manner as the royal council used to do. This reference to the royal council shows how ant. the ceremony was, and indeed before Edward I the king's council, by its deputies, conducted a private assay within the Mint as a condition of sanctioning the delivery of the coins to the owner of the bullion. Apparently this private ceremony was not a sufficient guarantee of the integrity of the coins, and hence it early became the custom to submit the coins to a public trial by a jury, repeated at short enough intervals to check improper conduct periodically by a jury of goldsmiths under the supervision of the king's remembrancer. In the reign of Edward III it seems that the trial was held every 3 months; after that it was held at uncertain periods, but to-day it is conducted annually.

Each coin is not assayed separately, however; samples only are taken. The term 'silver' is now only a courtesy title for coin that since 1947 has been made of cupro-nickel. The trial takes place before representatives of the Treasury and Mint, and the Board of Trade are also represented as that dept provides the scales and weights for weighing the coins and the standard plates of the alloy whereby the fineness is tested.

Q, seventeenth letter of the Eng. alphabet. It represents the Koppa of the earliest Gk alphabets, which (after the 5th cent. BC) survived only as a numerical symbol for 90. The Lat. alphabet adopted from Etruscan 3 signs having the phonetic value of *k*, *C*, *K*, and *Q*. In time it dropped the *K*, and used *C* for the sounds of *q* (the letter *G*, q.v., was created at a later stage) and *k*, the letter *Q* being retained for the sound *k* when followed by *u*. In the oldest form of our alphabet there was no *q*, *cu* or *kw* being used for the sound of *qu*. In Italian *q* is pronounced as in English, whilst in French and Spanish *qu* takes the place of the absent *K*. Also in English *qu* is in some words pronounced as *k*, e.g. pique, oblique, liquor, etc. See ALPHABET.

'Q,' see QUILLER-BOUCH, SIR ARTHUR THOMAS.

Q-factor in oscillatory circuits (q.v.) is the ratio of inductive reactance $2\pi fL$ to equivalent resistance, or $2\pi \times$ (energy stored in the circuit)/(energy dissipated in one cycle). The energy stored at maximum current I is $\frac{1}{2}LI^2$, energy dissipated per cycle is $\frac{1}{2}RI^2$, the ratio is $2\pi fL/R$.

Q-ships, name given in 1916 to those vessels used to decoy enemy submarines during the First World War. With them the name of Capt. (later Adm.) Gordon Campbell, V.C., D.S.O., will always be associated. Based on the supposition that U-boats would conserve their torpedoes when faced with an unarmed merchant vessel and, instead, surface to attack with the gun, these Q, or mystery, ships were disguised as peaceful merchantmen to cruise on the trade routes. But, with the pulling of a lever, the disguise could be cast off, guns disclosed, and fire opened instantaneously. The aim was to induce the U-boat to surface, throw open her conning tower, and approach to within point-blank range. Success demanded the highest degree of nerve and discipline. During the First World War 180 mystery ships of all sorts were fitted out, but the number of U-boats for which they accounted was only 11. Others were probably damaged. Unfortunately the first 2 or 3 Q-ships gave away the secret and caused the Germans to use greater caution when more were available. With the introduction of the convoy system in 1917, the lone ship was treated with even more suspicion, and Q-ships lost their effectiveness. A similar method of decoying U-boats was tried at the beginning of the Second World War, but the Germans were ready for it, declined to surface, and used their torpedoes. See Rear Adm. Gordon Campbell, *My Mystery Ships*, 1928.

Gain, see QAYEN.

Qairwan, see KAIROUAN.

Qarmathians, see KARMATHIANS.

Qasida, a verse form used by Persian, Arab, Turkish, and Urdu poets, which differs from the *ghazal* (q.v.) mainly in subject matter and length. It may be a panegyric or a satire, and didactic, philosophical, or religious. The Q. is longer than the *ghazal*, and may exceed a hundred lines. The poet's *nom de guerre* is not introduced into the final line as it is in the *ghazal*.

Qasim, prov. of the Nejd, Saudi Arabia. It is a region of sand dunes with many oases in the hollows and lies S. of Jebel Shammar, from which it is separated by a steppe-desert. 'Anaiza is a large oasis and the chief city (pop. 20,000); the other large city is Buraida (25,000), which has large palm groves. Q. has had a chequered hist. bound up with the rise of the Wahabi power. After a rebellion in 1782 Q. relapsed once more into subjection to the Wahabi state of the Nejd. From 1817 to 1841 Q. was under Egyptian rule, after which it was under the protection of the Sherif of Mecca, then fought over by Ibn Rashid of Jebel Shammar (q.v.) and Ibn Sa'ud, held by the Turks for a few years from 1905, and held finally by Ibn Sa'ud. The Qawasimi pirates of the Oman coast were notorious, and at one time had to be suppressed by Brit. naval vessels.

Qatar, peninsula of low barren hills projecting into the Persian Gulf, physically a part of the S. Arabian desert. Area 8000 sq. m.; pop. 20,000. It is an independent sheikhdom, reckoned to extend to the Trucial Coast. The prin. tn is Doha, which is also the residence of the chief. Oil has been found, and the revenue for it is £5m. yearly. Seafaring and pearl fishing were the main industries.

Qattara Depression, area in the N. Libyan desert, covering about 7500 sq. m., and below sea-level. There is a steep escarpment on its N. edge. The Q. D. formed the left-flank protection of the Brit. forces in the Alamein battle of 1942.

Qayen: 1. Dist. of E. Persia. The chief products are saffron, opium, millet, sugar beet, and turnips. Carpets are woven. The chief tn is Birjand.

2. Tn of E. Persia. Pop. 5000.

Qazvin, tn of Persia, c. 95 m. WNW. of Tehran. It has important vineyards, and a small textile industry. Q. was a flourishing tn throughout the Middle Ages, but was laid in ruins by the Molsong in the 13th cent. It was the cap. of Persia under the Safavid ruler Tahmasp. Pop. c. 66,000.

Qezel Uzon, see SAFIN RUD.

Qishm, or **Tavilah**, barren ls. in the strait of Ormuz, Persia. It is about 70 m. long and 4 m. broad. The chief tn is also called Q. The people derive their livelihood mainly from fishing. Pop. 20,000; tn 4000.

Qom, tn of Persia, c. 80 m. SSW. of Tehran, on the Trans-Iranian railway. It contains the shrine of Fatima (d. 818), the sister of the 6th Imam, Ali ar-Riza, and is a noted place of pilgrimage for Muslims of the Shi'ite sect. There is a manifold of porous vases. Pop. c. 96,500.

Quack, abbreviation of *quack-salver*; an unqualified medical practitioner, a seller of nostrums. **Q.**, a representation of the sound made by the duck, conveys the idea of voluble self-advertisement: 'salver' means healer. The term corresponds to the Fr. *charlatan*, from the It. *ciarlare*, to chatter.

Quadragesima (Lat., fortieth), Lat. name for the season of Lent (q.v.) which begins 40 days from Easter, without reckoning in the Sundays. The name is derived from that given to the first Sunday in Lent by analogy with the Sundays that precede it. Septuagesima, Sexagesima, and Quinquagesima. From it is derived the Fr. *carême*.

Quadrant, instrument formerly used by navigators to determine altitudes. It consists essentially of a quarter-circle of brass graduated to 1 min. of arc. The quarter-circle is set up in a vertical plane, with the zero set vertically beneath the centre of the circle by means of a plumb-line. The star or other object is sighted through a tube or telescope, and the position of the tube is given by a pointer moving over the quarter-circle. There were various varieties of Q.s besides the nautical, which were known either by the names of their inventors, as the Adams's, Collins's, Godfrey's, Hadley's, Gunter's, Sutton's Q., etc., or by the purpose for which they were intended, as gunners' and surveyors' Q. or by special names, such as the mural Q., the horodictical Q., etc. The difficulty of constructing an accurate instrument and of making observations by the Q. led to the introduction of complete-circle instruments, whilst the Q. for navigating purposes has been completely superseded by the sextant (q.v.).

Quadrant Electrometer, see ELECTROMETER.

Quadrate, see PALINDROME.

Quadratic Equation, an equation in which the highest power of the unknown quantity is the second. The general form of a Q. E. is $ax^2 + bx + c = 0$, the solution of which is obtained as follows. Dividing by a and moving the last term to the right-hand side, we have $x^2 + \frac{bx}{a} = -\frac{c}{a}$. Adding $\frac{b^2}{4a^2}$ to each side, it follows that $x + \frac{bx}{a} + \frac{b^2}{4a^2} = \frac{b^2}{4a^2} - \frac{c}{a}$. The expression on the left-

hand side is equal to $\left(x + \frac{b}{2a}\right)^2$, and taking the square root of each side $x + \frac{b}{2a} = \pm \frac{\sqrt{(b^2 - 4ac)}}{2a}$, from which $x = \frac{-b \pm \sqrt{(b^2 - 4ac)}}{2a}$. If the quadratic

expression can be factorised, as in the example in elimination (q.v.), this will simplify the solution, but many Q.E.s are not easily expressed as factors. When $b^2 = 4ac$ the roots of the equation are equal, each being $\frac{b}{2a}$, but if $b^2 < 4ac$ both

roots are imaginary, since the quantity under the radicle is negative.

In the Brit. Museum (and elsewhere) there are Babylonian clay tablets (c. 1600 BC) with mathematical texts in cuneiform giving numerical solutions to school problems involving Q. E.s. See A. E. Berriman, 'The Babylonian Quadratic Equation' (*Mathematical Gazette*, Oct. 1956). See also EQUATION.

Quadratic Surd, see SURDS.

Quadrature, in astronomy, the position of a heavenly body, in which its direction, as viewed from the earth, makes a right angle with that of another heavenly body, usually the sun. Otherwise expressed, a body in Q. has a geometric longitude differing from that of the sun by 90° . In mathematics Q. is the process by which a square is found whose area is equal to that of a given figure. The problem is, of course, solved if the number of square units in the given figure is found. The problem of Q. has been associated from early Gk times with the circle, and many intellects have been exercised and exhausted in fruitless efforts to 'square the circle.' The method of Q.s as applied to rectilinear figures presents no difficulty, as such figures can readily be reduced to rectangles. It is not possible to solve thus completely the problem of finding the area of a figure bounded by curves; but if a curve be regarded as made up of an infinite number of straight lines, it is possible to find its area without perceptible error. For example, the circle may be regarded as a regular polygon with an infinite number of sides, and there is a certain amount of justification for the assumption that what is true of all polygons will be true of the circle likewise. Now a polygon of n equal sides may be divided into n equal triangles; the area of each triangle is $\frac{1}{2}bh$, where b = base and h = perpendicular height from vertex to base. Area of polygon, therefore, $= \frac{1}{2}nbh$. But nb = perimeter of polygon, that is, in the case of the circle, its circumference, while h will be the radius. Area of circle, therefore, $= \frac{1}{2}$ circumference $\times r$. The circumference, however, is 2π times the radius, and the area of the circle may therefore be stated as πr^2 . The method of Q.s in Newton's time is the same as Leibnitz's method of integration.

Quadrilateral, in geometry, a plane figure bounded by 4 straight lines. The area of a Q. may be found by dividing it into 2 triangles by a straight line joining opposite angular points. Taking this line as a common base, the area of the Q. may be stated as the number of square units obtained by multiplying the number of linear units in half the diagonal by the number of linear units in the sum of the perpendiculars drawn to the diagonal

from the vertices of the two triangles into which it divides the quadrilateral.

Quadrilateral, military term applied to 4 fortresses forming, as it were, the corners of a Q., and mutually supporting each other. The most famous Q. is that formed by the fortresses of Peschiera, Mantua, Verona, and Legnago, the two former on the R. Mincio, the last two on the Adige.

Quadrille: 1. Name of a square dance of Fr. origin; 4 couples take part, and there are 5 separate and complete figures (Le Pantalón, L'Été, La Poule, La Trénise, and Finale), the whole forming 'a set of Q.s.' It was popular in the early 19th cent. in France at the court of Napoleon I., and in 1816 was introduced to England by Lady Jersey, a leader of fashion at that period, and at once became amazingly popular. Numerous Q.s were written, the music being based on some opera or other theme popular at the time. Thus Chabrier composed a set of Q.s on themes from *Tristan*.

2. Old card game, played by 4 persons with a pack from which the tens, nines, and eights were removed. It superseded ombre about 1726, and was in its turn superseded by whist.

Quadrirème (Lat. *quattuor*, four; *remus*, oar), anct ship of war which had 4 banks of oars instead of the more usual 3 of the trirème (q.v.). It was first introduced by Dionysius of Syracuse.

Quadroon, see MULATTO.

Quadrupana, obsolete order of 4-handed primates invented by Cuvier to include the apes, monkeys, and lemurs, but excluding man, who was placed in the order Bimana.

Quadruple Alliance, formed in 1718 between England, Austria, France, and Holland, with the primary object of thwarting Cardinal Alberoni, the Sp. minister, who was bent on regaining for Spain some of the dominions she had lost by the treaty of Utrecht. The alliance was particularly advantageous to England, as it practically deprived the Jacobites of their hope of raising a successful insurrection by the aid of foreign troops. Spain was powerless against the Q. A., and her fleet, in spite of the absence of any formal declaration of war, was destroyed by Byng in the same year off Cape Passaro. In 1834 another Q. A., of Britain, France, Portugal, and Spain, was designed to exclude Dom Miguel from the Portuguese throne. See LEAGUES.

Quaestor, name common to 2 distinct classes of officers in anct Rome: 1. The criminal *quaestores*, or, as Maine styles them, Rom. commissioners, were a body to whom the great Legislative Assembly, or Comitia, delegated its criminal jurisdiction. Maine thinks that in the earliest times a *quaestio* (commission) of this sort was appointed only to try a particular offender, like the *quaestores parricidii* who tried all cases of parricide and murder, though later commissions were appointed periodically without waiting for occasion to arise in the occurrence of some serious

crime. Finally, when a *quaestio perpetua*, or permanent commission, was appointed, Rom. criminal jurisprudence had attained to a developed classification of crimes and a regular criminal tribunal. 2. The *quaestores classici* were officers charged with the superintendence of the *fisc* or public treasury. A special body, the military Q.s, accompanied the consuls to the field, took charge of the military chest, and exercised supervision over pay, provisions, and booty.

Quagga, see ZEBRA.

Quaglio, It. family which has produced sev. generations of celebrated artists: Domenico, 'the elder' (1723-60), an historical painter, b. at Laino. Angelo (1784-1815), his grandson, an architect, designer, and painter. Two of his pictures are in the Munich Art Gallery. Domenico, the younger (1786-1837), grandson of Domenico 'the elder,' landscape and architectural painter, b. at Munich. He engraved 12 plates of architectural monuments, and pictures by him were acquired by Lorenz, 'the younger' (1793-1869), brother of the preceding, b. at Munich, lithographer and genre-painter. He painted a 'Tyrolean Inn,' in the Berlin National Gallery. Simon (1795-1878), a brother of the preceding, b. at Munich, was an architect, lithographer, and theatrical painter. See E. Hora, *Die Künstlerfamilie Quaglio*, 1932.

Quaid-i-Azam, title of the Pakistani leader and leader of the Muslim League, Mohammed Ali Jinnah (q.v.). He became the first Governor-General of Pakistan.

Quail, or *Coturnix*, small genus of game-birds, with a remarkably extensive range. The common Q. (*C. coturnix*) ranges over Europe, Asia, and Africa, and has been introduced into the U.S.A. and New Zealand. Great numbers spend the winter in N. Africa; and on starting in the spring to migrate northwards the flocks are lured by Q. calls and decoys, and are caught in huge nets extended along the shores of the Mediterranean. They are dispatched alive to various markets to be fattened and killed, the flesh being highly valued. The Q. is about 7 in. long, reddish-brown in colour, throat white with a black patch at the bottom; the breast is pale chestnut, and the belly yellowish-white. The nest is a small hollow in the ground, and in it are laid about 10 yellowish-white eggs blotched with brown. The bird feeds upon grain seeds and insects. The chestnut-throated species (*C. capensis*) is found in S. Africa. Another species, *C. japonica*, occurs in Japan and China. With both the common Q. freely interbreeds. The Virginian Q. (*Oryz virginianus*) belongs to the sub-family Odontophorinae, with a hooked tip to the bill.

There are 2 small species of Indian bush-Q., genus *Perdicula*. These are the jungle bush-Q., *P. asiatica*, and the rock bush-Q., *P. argoandah*. The general colour of the former is brown above, with pale buff shaft stripes on the back, underparts white, with black cross-bars

and throat rufous chestnut with whitish edges. Like the jungle species, the rock bush-Q. has the upper parts barred with buff and black or grey, but the rufous on the head and throat is dull brick colour and not bordered with white. The length of each is respectively 6.4 in. and 6.5 in.



Leonard Lee Rue III

AMERICAN QUAIL

They have much the same wide distribution, but while the jungle bush-Q. affects forests and jungles, the rock bush-Q. prefers the dry rocky plains or low hillocks and barren sparsely cultivated dists. Very similar in size and general appearance is the painted bush-Q., genus *Microperdic*. There are 3 species: *M. erythrorhyncha*, which frequents the SW. hills of the peninsula of India; *M. blewitti*, in the Central Provs.; and *M. manipurensis*, found in the SE. Manipur Hills and Sikkim. They are marked by a well-defined white band between the eyes and tawny underparts, the last-named being the handsomest of the genus.

Qu'aitis, powerful race of the Hadhramaut (q.v.), who inhabit the Q. state of Shihir and Soqatra, E. Aden protectorate. Their fortunes began with success in a protracted struggle with the Kathiris in the middle of the 19th cent. The Q. bound themselves not to dispose of any of the Hadhrami terra to any person or power other than the Brit. Gov., and a protectorate treaty was concluded in 1838. The present sultan is H.H. Sir Salih bin Ghahib al Q., premier chief of the E. Aden protectorate. His state is the best organised in this area. There is a Brit. resident adviser. Revenue (1955-6) £298,000; expenditure £292,000. See H. Ingram, *Report on the Hadhramaut*, H.M.S.O., 1936; *Arabia and the Isles*, 1942. See ARABIA.

Quakers, see FRIENDS; FOX, GEORGE. Quaking Grass, or Maiden's Hair, common name of the *Bria* genus of grasses with a loose panicle of short, flat, pendulous spikelets. *B. media* is also known as Doddering Dillies. See BRIZA.

Qualitative and Quantitative Microanalysis, see MICROANALYSIS.

Qualities, Primary and Secondary. The qualities or characteristics of material bodies were differentiated by Democritus, and the distinction persisted in philosophy. Primary qualities followed from the atomic structure and were mathematical, e.g. shape and size; secondary qualities, colour, heat, smell, etc., were the

result of action of the body on the soul or its senses. The former are inherent; the latter due to reaction. The distinction forms an important basis for the dualistic theory of mind and matter, and as such was upheld by Descartes in his mechanical theory of the universe. The objective reality of matter as deduced from its primary qualities, is insisted upon by both Descartes and Locke. Berkeley, however, strongly contested the point, insisting that the primary and secondary qualities alike are purely subjective; there is no proof of existence outside or separate from the mind. The monist philosophy is now generally adopted. The scientific attitude, however, has displaced the philosophic, and physics deals with qualities in their objective sense, psychology making an effort to analyse them subjectively.

Quamash, see CAMASSIA.

Quamoolit, family Convolvulaceae, genus of Amer. ann. twining herbs, of which *Q. coccinea*, Star Ipomoea, and *Q. lobata*, of Mexico, are grown as half-hardy anns. in Britain.

Quandary Peak, mt. of Colorado, U.S.A., with a height of 14,256 ft. It is in the Park Range. Gold, silver, copper, lead, zinc and molybdenum mines are in the vicinity.

Quang-yen, cap. of the prov. of the same name in Tonking (q.v.), standing on R. Chang, 12 m. NE. of Haiphong (q.v.). It is a busy port, accessible to large ships at all times; and the prov. is rich in coal and other minerals. See also DONG-THIEU; CAM-THIA; HON-GAY.

Quantification of the Predicate. Propositions in logic (q.v.) were classed by Aristotle by quality, as affirmative or negative; by quantity as universal or particular. Quantity had reference to the subject; thus, 'All quadrupeds are animals.' Sir W. Hamilton 'quantified' the predicate, thus distinguishing propositions further. The one quoted does not state whether all quadrupeds comprise all animals or not, and by quantifying the predicate we write, 'All quadrupeds are some animals,' thus stating whether the whole or only part of the predicate agrees with or differs from the subject. Aristotle considered affirmative propositions to have a particular predicate, and thereby excluded a whole class in which both terms were universal, e.g. 'The greatest truths are the simplest truths.' The number of propositions is largely increased, but many of the processes of logic are simplified. George Bentham, *Outlines of a New System of Logic*, 1827, introduced the subject.

Quantity Surveying, compiling a 'bill of quantities,' describing each article and the quantity required for the erection of a building, and prepared from a set of architects' plans. An estimate of cost and such information as will assist both the architect and building owner to arrive at their final decision are also necessary. The bills of quantities are sent to contractors inviting tenders.

The quantity surveyor must have a

technical training in building construction, with knowledge of materials and land surveying and levelling, for estimating the work to be carried out on building sites. He must be conversant with Acts of Parliament concerning building and contract law, and with council and local authority by-laws. Entrants to the profession either train as pupils or enter their employer's office as clerks, in either case earning a small salary. Technical knowledge is usually acquired through a correspondence course or at evening classes at a Technical College.

Quantity Surveyors, Institute of, founded 1938, offers membership by examination to quantity surveyors in private practice or with a gov. dept., public body or public utility company, or approved building or public works contractor. H.Q. are at 98 Gloucester Place, London, W.1.

Quantock Hills, range of coastal hills in NW. Somerset, England, extending 8 m. towards Taunton. They form a series of irregular ridges from which extensive views of the Welsh hills can be obtained, and they consist chiefly of greywacke and limestone. The chief height is Willsneck, 1270 ft. At Nether Stowey, 8 m. W. of Bridgwater, there are 2 cottages where the poet Coleridge lived from 1797 till 1800. Much of his best poetry was written here, including *Kubla Khan*, *The Ancient Mariner*, and the first part of *Christabel*.

Quantum Theory. This theory was first proposed by Max Planck (q.v.) at the beginning of the present century following his investigations on 'black body' radiation (see RADIATION). The laws of classical dynamics had failed to account for the distribution of the radiant energy from a 'black body' between the various wavelengths in the spectrum of the radiation. Planck made the bold assumption that the energy emitted by any 'vibrator' was parcelled out in discrete multiples of some fundamental unit or *quantum* of energy. Sir James Jeans has happily compared this idea with the manner in which an automatic machine can deliver its goods only in units. Such a machine will deliver a quantum of chocolate or a quantum of toffee, but it cannot deliver fractions of a bar of chocolate or of a packet of toffee. Expressed in mathematical form, Planck's theory states that if E is the amount of radiated energy of wave-length λ , then $E = nh\nu$, where the symbols have the following meanings; ν is the frequency of the radiation corresponding to the wavelength λ , and is equal to c/λ , where c is the velocity of light *in vacuo*, almost 3×10^{10} cm./sec.; n is any integral number, 1, 2, 3, etc.; and h is Planck's Constant. The value of h is very small—only $6.6252 \pm 0.00018 \times 10^{-27}$ erg.sec. (see ERG). As an example of the use of the energy formula given above, suppose we require the energy in a quantum of light—a *photon*—of wavelength 5×10^{-5} cm.; this implies a frequency of $3 \times 10^{15}/5 \times 10^{-5} = 6 \times 10^{14}$ sec.⁻¹. Hence $E = 6 \times 10^{14} \times 6.625 \times 10^{-27} = 39.75 \times 10^{-13}$ erg. A photon of

light of half this wave-length or twice the frequency would have twice this energy. It should be noticed that there is no fraction of $h\nu$, which represents the *minimum* of energy that can be delivered—the *quantum*, and that E varies according to the total number n of quanta taken into consideration. This Q. T. of radiation was accepted with some hesitation, since it involved a declaration of the failure of classical dynamics to cope with the problem. Modern physics, however, has developed at an enormous rate since then, and each advance in the field of atomic physics has emphasised the importance of the Q. T. One of its earliest applications was to the phenomenon of photo-electricity (q.v.). The photo-electric effect shows no time lag, i.e. it begins as soon as the metallic surface is illuminated. Further, the velocity of the ejected electrons was found by Lenard to depend only on the wave-length of the illuminating light, not on its intensity. These facts defy explanation by means of the wave-theory of light, but Einstein explained them by means of the Q. T. Briefly, the velocity with which an electron is ejected in the photo-electric effect is given by the Q. T. equation of Einstein: $\frac{1}{2}mv^2 = h\nu - W$, m being the mass of the electron, v its velocity, and W the work done in breaking loose from the surface of the metal when the latter is illuminated by light of frequency ν . The equation shows that the kinetic energy $\frac{1}{2}mv^2$ possessed by an electron is obtained from the energy $h\nu$ of a light quantum.

In 1913 the theory was applied by Bohr for the calculation of the frequencies of light emitted by atoms in the gaseous state (i.e. their characteristic line spectra). To account for the stability of atoms which are made up of a positively charged nucleus and negative electrons, it appeared necessary to assume that the electrons moved at high speed around the nucleus, each atom forming, in effect, a miniature solar system. According to classical theory, there was no reason why orbits of particular dimensions and energy should be more stable than others, whereas the fact that only light of particular frequencies was emitted indicated that only particular energy losses as radiation could occur. With the aid of the Q. T. Bohr proposed models of atoms which explained very successfully much of the detail of the characteristic spectra, although it still remained a mystery why only certain orbits were possible. The Bohr theory was extended by Sommerfeld and others, and was applied to X-ray spectra, as well as spectra of the visible, ultra-violet, and infra-red regions. The Q. T. also proved highly successful in connection with theories on such diverse subjects as those of specific heats, electrical conduction, chemical combination, and the periodic table of the elements.

Nevertheless, difficulties remained. In the first place it appeared impossible to explain certain characteristics of spectra unless somewhat artificial assumptions were made; in the second, although

such particles as electrons and protons apparently always behaved as particles and never as waves, radiation had perforce to be regarded sometimes as particles and sometimes as waves. In 1924 de Broglie put forward views which, when developed by Schrödinger, Heisenberg, and others, led to the new Q. T. According to this theory, electrons and protons are themselves to be regarded as a wave motion. This surprising conception has been completely justified in experiments that have shown that beams of electrons or protons can give rise to diffraction effects, and so possess one of the fundamental attributes of wave motion. The new theory explains why electron orbits in atoms can have certain magnitudes and no others, and has been completely successful in problems where the older one appeared to lead to anomalies. See E. U. Condon and P. M. Morse, *Quantum Mechanics*, 1929; I. I. Frenkel, *Wave Mechanics*, 1949; also Sir J. Jeans, *The Mysterious Universe*, 1931, and *The New Background of Science*, 1934; P. Karlson, *You and the Universe*, 1934; N. P. Mott and I. N. Sneddon, *Wave Mechanics and its Applications*, 1950; W. Heisenberg, *Physical Principles of the Quantum Theory*, 1952; L. de Broglie, *The Revolution in Physics: a Non-Mathematical Survey of Quanta*, 1953, and *Physics and Microphysics* (Eng. trans. by M. Davidson), 1955; L. I. Schiff, *Quantum Mechanics*, 1955; W. Heitler, *Elementary Wave Mechanics*, 1957.

Quantz, Johann Joachim (1697-1773), Ger. flautist and composer, b. Obersehlen, Hanover. He made a tour of the different European caps., charming all hearers with his dexterity of performance. He secured the patronage of Frederick the Great, whom he had instructed when Crown Prince. He composed some 300 flute concertos and a number of smaller pieces: his *Guide to the Flute* (1752) has great importance beyond its immediate subject for the information it gives on ornamentation and other conventions of the period.

Quanza, one of the main rvs. of Angola, Portuguese W. Africa; length 454 m. It flows in a NW. direction and finally reaches the Atlantic. Rice is grown in the adjoining swamps. The riv. is unnavigable in parts owing to the Cambambe Falls, but it can be navigated for a distance of 120 m. from its mouth to these falls.

Quarantine (Fr. *quarantaine*, period of 40 days), period during which a ship suspected of having cases of infectious disease on board is detained from communication with the shore. As originally instituted, Q. was practised for the plague, and later for yellow fever and Asiatic cholera. The first Act of Parliament concerning Q. in England was passed in 1710, but Q. in the original sense is abolished now in England, America, and sev. European states, though the name is still applied to the modern detention methods which have superseded it. In England the Ministry of Health Act, 1919, vested

Q. powers in the Ministry of Health. The initial steps in detaining a vessel may be taken by officers of the customs, coast-guard, or Board of Trade. All persons on board the suspected ship are examined by the medical officer of the port; those infected are removed, if possible, to a hospital; those in immediate attendance on the infected cases are detained for 48 hours; and the ship is then thoroughly disinfected.

The importation into Great Britain of certain animals, once any necessary licence has been obtained from the Board of Trade, is subject to various Q. regulations outlined in a form issued by the Ministry of Agriculture and Fisheries (Animal Health Div.). In the case of dogs and cats a licence is required, under the Importation of Dogs and Cats Order of 1928, to authorise the landing of the animal for Q. in Great Britain. Every such licence requires the detention and isolation of the animal for 6 months after landing on premises approved by the minister. The Parrots (Prohibition of Import) Regulations, 1930, were made on account of the occurrence of cases of psittacosis in England. The regulations prohibit the import of parrots, lovebirds, macaws, etc., except for specified purposes.

Quare Impedit. When an eccles. benefice in the Church of England becomes vacant, the patron must present his clerk (that is, a clergyman) to the bishop of the diocese for institution within 6 calendar months; and if the bishop then refuses to institute, the patron may obtain redress by applying for a writ of Q. I. ('why he hinders').

Quaregnon, tn in the prov. of Hainaut, Belgium, 4 m. W. of Mons. It has important coal mines and quarries of limestone. Chief industries are the production of coke, iron, steel, copper, and engineering. Pop. 18,000.

Quarenghi, Giacomo (1744-1817), It. painter and architect, b. Valle Inagna, Bergamo. He migrated to Russia, where he exercised a great influence over the development of architectural art.

Quaritch, Bernard (1819-99), bookseller and publisher, b. Worbis, Saxony. He came to London in 1842, and after working for a few years under Bohn, the publisher, set up for himself in a small second-hand business off Leicester Square. He began purchasing rare books in 1858, and in 1873 pub. a catalogue of the earliest productions of the printing-press of all countries, entitled *Bibliotheca Xylographica, Typographica et Palaeographica*. The various catalogues pub. by him are of great bibliographical value.

Quarles, Francis (1592-1644), poet, b. Romford, Essex. He was educ. at Christ's College, Cambridge, and studied law at Lincoln's Inn. In 1613 he became cup-bearer to Princess Elizabeth of Bohemia, and was later appointed secretary to Ussher, Archbishop of Armagh, Ireland. About 1633 he returned to England and began preparing his *Emblemes*, 1635, the work by which he is

best known; they consist of paraphrases from passages of Scripture and the Christian Fathers, concluding with epigrams. In 1639 Q. was made chronologer of the city of London. Other works are *Hadassa*, 1621, *Sions Songs sung by Solomon and periphra's*, 1625, *Hieroglyphikes of the Life of Man*, 1638, and *Enchiridion*, 1640-1. A complete ed. of Q.'s works was pub. by A. B. Grosart, 1880-1.

Quarnero, see KVARNER, BAY OF.

Quarry and Quarrying (O.F. *quarriere*; Low Lat. *quadraria*; Lat. *quadratus*, square), place from which stone is excavated; the process of excavating. The term 'quarry' is usually but not always restricted to workings in the open air, as distinguished from mines. The suitability of a stone for quarrying depends on: (1) its quality; (2) cheap and ready conveyance to a large market; and (3) its inclination and depth below the surface. The prin. deposits worked by quarrying are sandstones, limestones, marble, ironstones, slates, granite. The sandstones are classified as flagstones, freestones, and tilestones. A thick deposit of sandstone may provide all 3 classes of stone at different levels or 'lifts.' The mechanised underground quarries at Bath produce about a quarter of Britain's building stone. Deposits that outcrop on the surface are best won by open-pit work or quarries, while thick or deep deposits are worked by underground methods. In open-pit work it is sometimes necessary to remove the soil or waste rock over the valuable stone before excavation can start.

In most rocks there are planes or joints along which the material will split or part readily. Even in a massive rock like granite there are vertical or highly inclined 'joints' which extend for long distances. Sedimentary rocks have bedding planes along which the stone can be readily divided. To 'cleave' means to split into laminae or leaves. Slate is the best-known example of a cleaved rock. It was deposited originally as a clayey bod which in time hardened into shale. Later this shale was submitted to immense lateral or side pressure, and its tiny particles rearranged so as to give the rock a slaty cleavage. The cleavage-planes are perpendicular to the direction of pressure. The best slates are obtained from various parts of N. Wales. The quarries are mostly 'open,' but sometimes the slate occurs at some depth, which necessitates underground methods. The slate is cut into large blocks, which are divided by splitting into slabs about 3 in. thick. These go to the sawing tables, where they are cut to about 1 in. in thickness. This operation may be performed by hand, or the slabs can be split, sawn into shape, and planed smooth by machinery. A slate quarry provides roofing-slates and thick slabs used for tombstones, cisterns, and billiard-tables.

The nature of the deposit and general conditions determine the method of excavation and the machinery to be used.

Small quarries still employ manual methods, such as pick, shovel, and wheelbarrow, with carts and lorries. Stone is also excavated by drilling and blasting with gelignite. Large quarries may employ power shovels, bulldozers, dragline or bucket excavators, and locomotive cranes on tracks. The power shovel, which is employed extensively, is mounted on tread tractors and operated by electric motors or by a Diesel engine. The shovel can handle from 1 to 5 cub.

known as the arc-shearer, can cut the stone horizontally or vertically. Automatic jacks lift the machine for top- or over-cutting. Electric cranes are then used to remove the blocks of stone, which are swung on to trucks or wagons. A rock planer is sometimes used in limestone quarries which 'shaves' or planes off portions of the stone at the rate of 50 tons per hour, with only 2 men in attendance. Mechanical picks worked by compressed air or electricity are also used extensively. The excavated stone is then hauled to market or to the screening, crushing, or refining plant by lorry, wagon, or road locomotive.

Quart, see METROLOGY.

Quarter, see METROLOGY.

Quarter Days, appointed for the payment of house and land rents, and for the incoming and outgoing of tenants, occur on 25 March (Lady Day), 24 June (Midsummer Day), 29 Sept. (Michaelmas Day), and 25 Dec. (Christmas Day).

Quarter-deck, originally a smaller deck placed above the half-deck and covering about a quarter of the vessel. It is now used for that part of the spar deck extending between the poop and the mainmast, used by officers only.

Quarter Sessions, see COUNTY SESSIONS; SESSIONS OF THE PEACE; JUSTICES OF THE PEACE.

Quartering, see HERALDRY.

'Quarterly Review', Tory review of essays, politics, and general literature, estab. in 1809 by the celebrated publisher John Murray, as a competitor of the Whig *Edinburgh Review*. The first editor was Wm Gifford (q.v.), who held that post till 1824. Gifford was also a contributor, but his critiques and satirical poems which appeared in the *Q. R.* while he was editor were marred by their intention to annihilate everyone who held views contrary to Peel, Canning, or other Tory ministers of the day. It was in the pages of the *Q. R.*, in 1831, that the party was first called Conservative, and Lord Baldwin, when Prime Minister, once called it the 'godfather of the Conservative party.' It was an adverse review (1818) of Keats's *Endymion* in this periodical which led Byron to observe that Keats had been 'snuff'd out by an article' when the poet d. in 1821.

Quartermaster, in Brit. Army, the officer in charge of all rations, supplies, and stores in a battalion or corresponding unit. In the navy a petty officer who is

concerned with stowage, steering, soundings, etc., of the ship.

Quartermaster Corps, in U.S. Army, perform the same function as the Brit. R.A.S.C., R.E.M.E., and R.A.O.C. in so far as the last are not solely concerned with the supply and repair of weapons.

Quartermaster-General, the senior administrative officer in charge of army supplies, the head of the Q. branch of the staff, who is represented at all H.Q., but whose deputy at lower level is also the deputy of the adjutant-general (q.v.).

Quartern, name used for a quarter of a pint in liquid measure, a quarter of a peck in dry measure and a 4-lb. loaf.

Quarterstaff, stout pole from 6 to 8 ft long and 1½ in. in diameter. It was grasped by one hand in the middle and by the other midway between the middle and end; it was much used in medieval England by the peasantry as a weapon.

Quartet, musical composition in 4 parts, vocal or instrumental, of which each part is essential. The string quartet originated in the 18th. operatic overture, was made independent by Haydn, and developed by Mozart and Beethoven; the latter, in his last Q.s evolved new forms in a type of music generally written in sonata form. Apart from string Q.s for 2 violins, viola, and cello, a much cultivated medium is the piano Q. (violin, viola, cello, and piano). Vocal Q.s are a great feature in opera and oratorio works written up to the time of Wagner.

Quarto: 1. Sheet of paper so folded as to make 4 leaves, or a book printed on paper so folded; usually abbreviated to 4to. The usual varieties are Crown Q. (10 by 7½ in.), Royal Q. (12½ by 10 in.), Foolscap Q. (8½ by 6½ in.), and Large Post Q. (10½ by 8½ in.).

2. In Portugal, a liquid measure approximating to 3½ litres.

3. In Italy, a dry measure, approximately just over 2 bushels.

Quartz (silica, silicon dioxide, anhydrous silicic acid, SiO₂), most abundant mineral in the crust of the earth. It has a vitreous lustre, cannot be scratched with a knife, but scratches glass (h. = 7); it is insoluble in HCl, H₂SO₄, or HNO₃; it may be fused by the blowpipe; exhibits no cleavage, but chips easily with conchoidal fracture. No alteration is shown under the microscope, and it remains colourless except for liquid inclusions; refractive index low; polarisation tints pure but rather weak. Q. occurs as an ingredient of acid igneous rocks, such as granite, and of gneiss; being soluble in natural waters, it is found deposited in veins in rocks, especially Archaean and Palaeozoic; conglomerates and sandstones are usually chiefly composed of Q., and its crystals line most metalliferous lodes. The crystals are mostly hexagonal prisms terminated by hexagonal pyramids, being mostly combined growths of 2 or more simple crystals; when highly heated and allowed slowly to cool, they are appositely electrified at alternate edges and corners. If a thin strip of

crystal cut at right angles to the longitudinal axis is placed between vector prisms, the plane of polarisation is rotated. Q. occurs in 3 species. Q. *proper* (rock crystal, amethyst, rose Q., citrine, cairngorm, morion, occidental sapphire, occidental emerald, milky Q., prase, ferruginous Q.); *chalcedony* (chrysoprase, sard, carnelian, agate, onyx, sardonyx, cat's eye, plasma, flint); *jasper* (common, Egyptian, and riband; heliotrope and lydian stone). The colour varies with the impurities; blue, green, yellow, purple, pink, and brown; when good they are used instead of precious stones. Rock-crystal (sp. gr. 2.5-2.8) is used for vases and other ornaments and for spectacle glasses. Ornamental forms contain pyrites, silver, or gold, in spangles, needles, or leaves; or hair-like threads of hornblende, asbestos, iron oxide, or the oxides of titanium or manganese. Q. in the oxy-hydrogen flame can be drawn into threads of great tensile strength, 50 to 70 tons per sq. in. of section; these are used for torsion balances and galvanometers. They alter very little with heat and do not crack with sudden change of temp.; on account of this, fused Q. is a substitute for glass in some scientific instruments, such as thermometers. See also CAIRNGORM STONE and separate articles on the species named above.

Quartz Crystal Oscillators, see OSCILLATORS.

Quartz Glass, or silica glass, is fused quartz that has been allowed to cool to a vitreous, amorphous mass. It is widely used for gas globes, scientific apparatus, etc., since it has a small coefficient of thermal expansion and may therefore be quickly heated or cooled without breaking. Unlike ordinary glass, it is transparent to the ultra-violet rays. The pioneer in its use was W. A. Shenstone, F.R.S.

Quartz Porphyry, see PORPHYRY.

Quartz Rock or **Quartzite**, geological name of rock formed essentially of quartz grains which have been cemented together by percolating solutions, or which have been welded together by recrystallisation during metamorphism. Q. is derived from sandstone, which is the rock formed by the consolidation of sand. Pure Q. is white, but Q. is usually stained by iron compounds to a pink, red, or orange colour. Q.s often stand out in the landscape as they are resistant to weathering. They have a hard crystalline or vitreous appearance.

Quasimodo Sunday, another name for Low Sunday (q.v.), derived from the opening words of the Introit to the Mass for that day, *Quasi modo geniti* (as newborn babes).

Quassia, name given to: (1) *Q. amara*, tree native to tropical America, with pinnate leaves, and winged leaf-stalks, and terminal clusters of scarlet flowers; with bitter root and bark of tonic medicinal uses; and (2) *Picrasma excelsa*, a Jamaican tree, the wood yielding 'Q. chips,' at one time widely used as the source of an insecticide.

Quaternary, or **Post-tertiary**, geological period from the Tertiary to the present day. It consists of the Pleistocene, containing many extinct mammals, and the Recent, with only a few, both divs. being characterised by molluscs not yet extinct. The deposits are sand and shingle alluvium, river-gravels, brickearth, and clay-with-flints. The ice sheet (see **GLACIAL PERIOD**) extended S. to mid Europe and mid N. America, driving before it animals and plants, so that just N. of the Mediterranean there existed Tundra (q.v.); there were successive glacial advances and retreats, and the ice then retreated gradually to its present position, the climate becoming milder. The evidence beyond fossils includes moraines, raised beaches, erratic blocks, sands and gravels with lacustrine deposits, boulder clay or till, polished or striated rocks, and particularly the skeletal remains, tools, and art of early man. In Britain the correlation of human cultures and the glacial phenomena has received much attention by archaeologists who have correlated their work with researches undertaken in Sweden, the Alps, France, and Spain. The discoveries of human bones and stone tools in Africa, China, and Malaya are now leading to a wide interpretation of the Pleistocene time-scale to lands far removed from the European ice-sheets.

Quaternion. A Q. consists of a scalar part and a vector (q.v.), and is defined as an operator turning one vector into another, or as a quotient of two vectors. Writing $a = Sa + Va$, the conjugate Q. of a is $Sa - Va$. Two Q.s a and b are equal if $Sa = Sb$ and $Va = Vb$. In alternating current (q.v.) theory, the impedance is a Q., $Z = R + jX$, turning the current vector into a voltage vector. If the current lags by an angle ϕ , $R = Z \cos \phi$, $X = Z \sin \phi$, and the Q. $Z = Z (\cos \phi + j \sin \phi)$. The tensor is $\sqrt{R^2 + X^2}$. The product of a Q. and its conjugate is a pure scalar. See Sir W. R. Hamilton, *Lectures on Quaternions*, 1853; E. B. Wilson, *Vector Analysis*, 1901 (expansion of *The Elements of Vector Analysis*, by J. W. Gibbs); P. Kelland and P. G. Tait, *Introduction to Quaternions*, 1904; J. B. Shaw, *Vector Calculus*, 1922; and L. Silberstein, *Synopsis of Applicable Mathematics*, 1923.

Quatrain, 4 rhymed lines which may be of any length, but linked by a unity of thought, as, for example, in an epigram, for which the Q. is often used.

Quatre-Bras, vil. in the prov. of Brabant, Belgium, situated about 10 m. S. of Waterloo. It was the scene of a battle on 16 June 1815 between the Brit. under Wellington and the Fr. under Ney, when the latter was repulsed. Simultaneously Napoleon was attacking Blücher at Ligny as part of the plan to separate and destroy in detail the allied Brit. and Prussian forces. A bronze lion was erected here to the memory of the duke of Brunswick in 1890. See also **WATERLOO**.

Quatrefores de Bréau, Jean Louis Armand de (1810-92), Fr. naturalist, b. Berthezène (Gard), the son of a farmer.

Having taken his M.D. and D.Sc. degrees at Strasburg, he accepted, in 1833, the chair of zoology at Toulouse, but in 1840 was drawn to Paris, where he eked out a livelihood by illustration and also by writing articles, as, for example, that 'sur les caractères zoologiques des rongeurs,' for the *Revue des deux Mondes*. In 1855, after lecturing for 5 years at the Lycée Napoléon, he was appointed to the chair of anatomy and ethnology at the Musée d'Histoire Naturelle. Among his scientific pubs. may be cited his *Charles Darwin et ses précurseurs français*, 1870, in which he opposes the evolutionists; *Crania ethnica*, 1875-82, in which Dr Hamy was his collaborator; and *Histoire générale des races humaines*, 1886-9, a valuable contribution to anthropology. Eng. trans. of his works include *Metamorphoses of Man and the Lower Animals*, 1884; *The Prussian Race*, 1872; *The Human Species*, 1879; and *The Pygmies*, 1895.

Quatrefoil, in architecture and heraldry, an ornament used in tracery, etc., consisting of 4 'leaves' somewhat similar to the 4-leaved clover.

Quattrocento (It. 400, contraction for 1400, cf. Cinquecento), term applied to the It. literature and art of the 15th cent. Artists of that period, who are called Quattrocentists, include Donatello, Ghirlandajo, Brunelleschi, and Fra Lippo Lippi.

Quaver, character or note in music, equal in duration to an eighth of a semibreve or 2 semiquavers. Amer. terminology, following Ger. instead of Eng., now uses 'eighth note' for Q., but this is illogical and confusing, since a semibreve, as its name implies, is itself one-half of a larger unit, the breve, which would make the Q. a 'sixteenth.' A Q. rest indicates silence for the duration of a Q. Smaller divisions are called semiquavers, demisemiquavers, hemidemisemiquavers, and it must be admitted that this is so cumbersome, that there is something to be said in favour of the Ger.-Amer. terms.

Quchan, dist. and tn of Khorasan, Persia. The main products are grain, opium, fruit, and pastoral produce. It was destroyed by earthquakes in 1893 and 1895. Pop. of tn and dist., c. 214,000; of tn, 21,000.

Que Que, tn of S. Rhodesia, 150 m. by road from Bulawayo and 142 m. from Salisbury. Q. Q. is centre of an important gold and iron mining area. The close proximity of the Rhodesian Iron and Steel Corporation must ensure its rapid industrial growth. Pop. (1955) including Iron and Steel Corporation township: Europeans, 2400; Africans, 8000.

Queanbeyan, tn of New S. Wales, Australia, on the Murrumbidgee R., only 5 m. from Canberra (q.v.), the federal cap. It is situated in a pastoral dist., but owes some of its development to its proximity to Canberra. Pop. 7550.

Quebec, the largest prov. of Canada, bounded on the N. by Hudson Strait (the boundary was extended in 1912 so as to

include the dist. of Ungava), on the W. by the R. Ottawa, and on the S. by the U.S.A. and New Brunswick. From 1535 to 1763 it was known as New France or Canada; until 1790 as the prov. of Q.; until 1846 as Lower Canada; and in 1867 became once more known as the prov. of Q. On the E. the prov. has a coast-line of 825 m. on the Atlantic, and covers in its northward extension from the St. Lawrence and Ottawa Rs. to Labrador and the Hudson Strait over 17° of lat. and an area (as amended by the Labrador Boundary Award) of 594,860 sq. m. (523,860 sq. m. land and 71,000 sq. m. water). Of this area 351,780 sq. m. represent the ter. of Ungava, annexed under the Quebec Boundaries Extension Act, 1912. Anticosti and the Magdalen Isles in the Gulf

position, i.e. the Protestant and the Rom. Catholic systems. The school system is governed by the Education Act, which places it under the supervision of the dept. of education, under the authority of the prov. secretary, but the superintendent of education is charged with the administration of the dept. Assisted by 2 secretaries, 1 for each of the 2 religious denominations, he sees to the carrying out of the law and the observance of the regulations established by each of the committees (Catholic and Protestant) of the Council of Education and approved by the Executive Council. Prov. of Q. schools comprise 4 categories, divided according to the degree and kind of tuition they provide: primary, secondary, superior, and special schools.



Canadian Pacific Railway

UNIVERSITY OF MONTREAL, QUEBEC PROVINCE

of St. Lawrence are attached to Q. The surface of the prov. is diversified: there are vast stretches of forest, many rivers and lakes, and much agric. land. Q. belongs almost entirely to the basin of the St. Lawrence; the 2 prin. ranges of mts. run parallel with the course of the river, SW. to NE., the Notre Dame Mts. being on the S. and the Laurentian Mts. on the N. In addition to the St. Lawrence itself, the prin. rivers are its tribs., the Ottawa (forming for much of its course the boundary between Ontario and Q.), the St. Maurice, and the Saguenay on the l. b., and the Richelieu, the St. Francis, and the Chaudière on the r. b. There are a large number of lakes, of which the prin. are the St. John, the Mistassini, and the Abitibi on the N., and the Témiscouata, the Memphremagog, and the Mégantic on the S. of the St. Lawrence.

EDUCATION. There are 2 distinct systems of education in Q., in each of which religion occupies a prominent

Superior Education. The prov. has 6 univs.: 3 Protestant univs., McGill (Montreal) founded in 1821, Bishop's (Lennoxville) founded in 1845 and the Sir George William's College (Montreal) granted a univ. charter in 1948, with together 1140 profs and 18,048 students in 1954-5; and 3 Catholic univs. Laval (Quebec) founded in 1852, Montreal Univ. opened in 1876 as a branch of Laval and erected independently in 1920, and Sherbrooke Univ. founded in 1954, with together 3529 profs and 27,486 students in 1954-5. Besides univ. schools (included with the univ. figures), there are 23 Catholic and 3 Protestant theological colleges with 891 students.

Secondary Education. Secondary education, for Catholics, is given in 66 classical colleges and 3 colleges of modern secondary education to 21,561 male students. Both Catholic and Protestant high schools are completely included with the primary education.

Primary Education. There were 9245 Catholic schools, with 34,060 teachers and 782,991 pupils, and 355 Protestant schools, with 3640 teachers and 95,773 pupils in 1954-5. Training of teachers for primary schools is given in 102 Catholic normal schools to 5752 students and in 1 Protestant school to 286 students.

Special Schools. Great attention is given to-day to education that has a direct bearing on industry and commerce. The ordinary schools, those for primary, secondary, and superior education, are augmented by a number of special schools for giving instruction in agriculture, forestry, household science, domestic handicrafts, furniture-making, graphic arts, textiles, social service, music, and dramatic art. These come under a dept of social welfare and youth, recently created to supervise social policies and to aid youth in preparing for its future by means of technical education. Large gov. grants are made to technical schools in Montreal, Quebec city, Three Rivers, Hull, Lachine, Rimouski, Chicoutimi, Sherbrooke, Shawinigan Falls, so that scientific and practical training may be given to apprentices, journeymen, foremen, clerks, salesmen, and others following an industrial and commercial life. These special schools mark a departure from the concentration on classical education which for long dominated education in Q.; and they reflect also a response to changing social and economic conditions, among which not the least important is the increase of the prov.'s industrial pop. during the Second World War by the requirements of labour in factories in Montreal, Quebec city, and other cities.

AGRICULTURE. The total area of the 134,336 farms in the Prov. was 16,786,405 ac. in 1951, that is, an average area of 125 ac. The superficies of improved land amounted to 8,828,968 ac., of which 5,790,359 ac. or 65.6 per cent were under crops, and unimproved land comprised 7,957,437 ac. The farm acreage represented 5 per cent of the total superficies of the prov., which is 355,270,400 ac.

The cash income of farm operations from sale of farm products was estimated at \$426m. in 1955, that is, an increase of 4.4 per cent compared to the 1954 figure of \$407,947,000. The increase is mainly attributable to livestock and dairy products, which showed respective increases of 8 and 4 per cent over 1954.

The area sown in field crops in the prov. was 5,526,600 ac. in 1954, in comparison with 5,544,800 in 1955. The farm value of field crops was estimated at \$144.7 m. in 1955, compared to \$146,402,000 in 1954. The prin. crops grown include oats, hay and alfalfa, potatoes, barley, mixed grains, buckwheat, fodder corn, turnips, beet, etc. Tomatoes, apples, plums, and other fruits are also grown, especially in the S. Most farmers own their farms, and the outstanding crops grown are hay, oats, and potatoes.

The 1955 production of maple products

(expressed as syrup) in the prov. was 1,913,000 gallons, estimated at \$9,393,000. The prov. produced 89 per cent of the syrup in Canada.

Livestock on prov. farms was valued at \$265.6m. at 1 June 1955, compared to \$271,817,000 in 1954. The number of horned cattle has increased steadily since 1951: in 1955 there were 2,058,000 head of cattle on Q. farms, that is, 417 more than 1941. The number of hogs had increased from 1,051,000 in 1954 to 1,272,000 in 1955, while poultry had dropped from 11,390,000 in 1954 to 9,773,000 in 1955.

Dairying is one of the most important industries, dairy products being valued at \$239,865,000 in 1955. The output of creamery butter rose to a new peak in 1955 with 125,000,000 lb., worth \$73m., that is, an increase over 1954 of 3.8 per cent in quantity and of 4.5 per cent in value. Production of factory cheese in 1955 amounted to 18,000,000 lb. valued at \$5.4m. During the same year 6,059,913,000 lb. of milk were produced in the prov., that is, more than 35 per cent of the total Canadian production. Moreover, Q. accounted for about 35 per cent of the Canadian butter produced and for 15 per cent of all Canadian cheese. The butter of Q. is internationally renowned for its flavour.

FOREST INDUSTRY. Forestry production, which comprises all timber cut, shows an increase of 10,000,000 cub. ft. with a cut of 920,000,000 cub. ft. in 1955. Timber cut on Crown lands amounted to 521,920,681 cub. ft., and the quantity cut on private lots was 438,321,862 cub. ft. In 1954 there were 12 pulp-mills, 10 paper-mills, and 33 pulp- and paper-mills. The gross value of manufactured products was estimated at \$532,327,040. 4,315,465 tons of pulp and 3,667,794 tons of paper were produced. In 1954 the industry employed 25,643 workmen and the payroll amounted to \$103,681,586. Activity in the pulp and paper industry remained on a very high level during 1955. It is estimated that the gross value of production attained \$540m. or an increase of 171.1 per cent over the value of production in 1945. In 1954 the prov. produced 4,315,465 tons of pulp valued at \$265,837,385, that is, 46 per cent in quantity and 43 per cent in value of the total production of Canada.

Newsprint production in Q., the value of which represents around 65 per cent of the total value of pulp and paper, rose to a record peak in 1954. The output was estimated at 3,080,048 tons valued at \$336,574,299. 1955 production was estimated at 3,200,000 tons valued at \$350m., that is, an increase of 4 per cent over the previous year and of more than 229 per cent compared to the value in 1945. The total production of paper of all kinds was 3,667,794 tons, with a value of \$435,083,677 in 1954.

The prov. of Q. leads the Canadian provs. in the fur-goods industry. The gross value of its output in 1953 was \$35,101,026, and represented over 55

per cent of the entire Canadian production.

MINERAL PRODUCTION. The value of the prov. of Q.'s mineral production reached a new peak in 1955 with an output valued at \$385.4m., that is, an increase of 40 per cent over the record attained in 1954 (\$275.3m.). Metals showed a 78 per cent increase, due to iron ore. The most important metals produced in the prov. are gold, copper, and zinc and are situated in Rouyn and the neighbouring townships in the W. part of the prov. Q.'s gold mines account for over 25 per cent of the Canadian output. The value of copper produced in Q. kept within \$12-15m. between 1938 and 1945; in 1954 the value of the output of copper reached \$48.9m. The quantity of copper extracted during 1954 was estimated at 167,000,000 lb., and the average price was 29.16 cents. The value of copper produced represented 27.8 per cent of the Canadian output in 1954. The value of copper produced in 1955 was estimated at \$74.4m. In the Gaspé Peninsula, Gaspé Copper Mines Ltd., a subsidiary of Noranda Mines Ltd., began development work on the large copper deposits said to contain 70,000,000 tons of ore grading approximately 1.3 per cent copper and situated in Holland Township, in the electoral dist. of Gaspé North.

One of the more important events in the mining industry in 1955 was the putting into operation in June of Campbell Chibougamau Mines Ltd.'s concentration plant. Opening with a capacity of 1750 tons a day, the rate was shortly afterwards increased to 1850 tons. In the same dist. Chibougamau Explorers Ltd. began production from its copper-gold deposits early in 1956. This company's ore reserve had been brought up to 1,500,000 tons by the end of 1955. Finally, in New Q., the Iron Ore Co. and its 2 subsidiaries, the Hollinger North Shore and the Labrador Mining and Exploration companies, exceeded their objective with 7,700,000 tons of iron ore shipped through their harbour at Seven Islands.

The value of zinc production in 1954 amounted to \$25,637,532. In 1955 it was estimated at \$28,008,000. Zinc concentrates extracted rose to 214,000,000 lb. in 1954.

The asbestos deposits, which, geologically stated, occur in altered peridotite in SE. Q., are the most productive in the world. The most important deposits are those at Black Lake, Thetford, Robertsonville, E. Broughton, and Danville. Mine companies, operating 13 mines, manufacture asbestos products, including asbestos paper and millboard, roofing and building materials, pipe insulation and insulating sheets and blocks, and packing for steam, oil, and hydraulic operations. In 1954 asbestos production amounted to 894,128 tons, valued at \$79,906,506, in 1955 it was estimated to be worth \$88,558,000.

Among the most important projects pertaining to the mining industry, one

worth mentioning is American Smelting and Refining Co.'s plan to put into production its vast deposits under Black Lake in Megantic County. In order to permit mining of the reserves of 50,000,000 tons grading 7 per cent of asbestos fibre, it will be necessary to remove the 30,000,000 cub. yds of mud which lie under 50 ft of water. Plans also call for the construction of a mill with a daily capacity of 4000 tons.

HYDRAULIC RESOURCES. Q. possesses greater wealth in water-power resources than any other Canadian prov.: it owns more than 40 per cent of the water power recorded in Canada at the present time. The actual capacity of turbines in Q. represents nearly 45 per cent of total turbines installation in Canada and around 33 per cent of resources recorded to date. Besides, Q. owns the 2 largest power plants in Canada: the Beauharnois power development, situated on the St. Lawrence River and controlled by the Q. Hydro-Electric Commission, which has a 1,408,000-h.p. capacity, and the 1,200,000 h.p. plant at Shipshaw on the Saguenay R. operated by the Aluminium Co. They are among the largest hydro electric plant in the world.

The capacity of hydro-electric turbines in the prov. of Q. was increased during 1955 to reach 7,975,657 h.p., and other large-scale projects are on the way to completion. Increased capacity was expected to be 513,000 h.p. in 1956, 492,000 in 1957, and 1,550,000 in 1958. During 1955 Q. Hydro-Electric made good progress on its Bersimis R. project, and the 3 first units, each consisting of a 150,000-h.p. turbine, are in operation. The ultimate capacity of 1,200,000 h.p. should be installed in 1958.

Among other interesting projects is the Hydro-Electric Commission's plan to start construction on the St. Lawrence of Beauharnois Plant, which will have an initial capacity of 450,000 h.p. and an ultimate capacity of around 675,000 h.p. Besides, the Commission is also pressing its studies of the first stage of the Lachine development of 900,000 h.p.

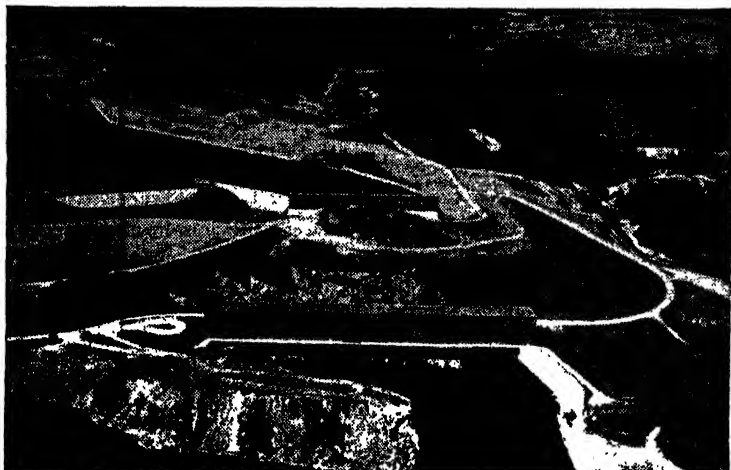
MANUFACTURES. With a production valued at \$5.5 billion in 1955, the prov. of Q.'s manufacturing industry exceeded the record peak of \$5,395,786,644 in 1954 by 4 per cent. Besides, Q. manufs. provided work for 424,095 employees, whose payroll amounted to the sum of \$1,214,661,400 in 1954. The employment index in Q.'s manufs. was 107.1 in 1954 and 107.5 in 1955. From 1945 to 1955 the gross value of the manufacturing industry in the prov. of Q. more than doubled, having climbed from \$2.5 billion to \$5.5 billion. During the same period salaries and wages increased from \$607 m. to \$1.3 billion. Q., with about 30 per cent of Canada's total selling value of factory shipments, ranks as the second largest industrial prov. in Canada.

Q.'s leading industry is pulp and paper, with an output of approximately \$533m. in 1954. Q. is a prin. centre for the production of newsprint, with 55 major pulp-

and paper-mills. By the end of 1954 it accounted for about 10 per cent of the gross value of Q.'s manufs. and for about 43 per cent of the Canadian total for this industry. Other large Canadian industries in which Q. predominates are tobacco, cigars, and cigarettes, 94.6 per cent of the Canadian total; women's factory clothing, 69.4 per cent; cotton yarn and cloth, 66.7 per cent; leather footwear, 59.0 per cent; men's factory clothing, 56.6 per cent; synthetic textiles and silk, 52.9 per cent; miscellaneous electrical apparatus, 44.6 per cent; railway rolling stock, 43.9 per cent; and pulp and paper, 42.9 per cent.

products, 53.8 per cent; medicinal and pharmaceutical preparations, 47.8 per cent; woollen cloth, 45.4 per cent; buttons, 43.9 per cent; musical instruments, 39.1 per cent, etc.

The prin. cities are the cap. Q. (q.v.), pop. 167,000; Montreal, the commercial metropolis, 1,094,000; Verdun, 77,500; Sherbrooke, 58,500; Trois-Rivières, 50,200; and Hull, 48,800. The gov. is composed of a Lieutenant-Governor named by the gov. of Canada, an executive council of 21 members, a legislative council of 24 members appointed for life by the Lieutenant-Governor in Council,



Aluminium Company of Canada

SHERBROOKE, SAGUENAY RIVER, QUEBEC: THE GREATEST HYDRO-ELECTRIC DEVELOPMENT IN CANADA

No. 2 powerhouse and headblock, 875 feet long, houses twelve generators with a total capacity of 1,200,000 h.p.

Q. also predominates in a large number of the smaller industries. The candle industry contributed 97.1 per cent of the Canadian total; men's clothing contractors, 93.4 per cent; cotton thread, 84.1 per cent; women's clothing contractors, 83.4 per cent; dyeing and finishing of textiles, 80.9 per cent; children's clothing, 78.0 per cent; embroidery, pleating, and hemstitching, 77.3 per cent; lasts, trees, and shoe finding, 74.3 per cent; oilcloth, linoleum, and coated fabrics, 74.1 per cent; artificial flowers and feathers, 72.0 per cent; narrow fabrics, 71.2 per cent; fur dressing and dyeing, 69.2 per cent; boot and shoe finding and leather, 68.7 per cent; miscellaneous clothing, 67.3 per cent; corsets, 64.1 per cent; process cheese, 63.8 per cent; miscellaneous textiles, 59.2 per cent; fur goods, 56.4 per cent; asbestos

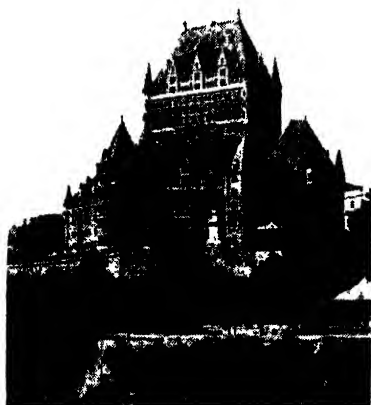
and a Legislative Assembly of 93 members elected for 5 years; 24 senators and 65 members of the House of Commons represent the prov. in the Canadian Parliament. The pop. in 1951 was 4,055,681 (estimated pop. in 1956, 4,634,000). According to religious beliefs 3,563,951 were Rom. Catholics; 166,761 Anglicans; 129,219 United Church; 82,701 Jews.

In 1951 the pop. of French origin amounted to 3,321,128, that is, 82.0 per cent of the prov.'s total pop.; 491,818 individuals or 12.1 per cent of the pop. traced their origin to the Brit. Is.; other racial groups made up 5.9 per cent of the pop.

Quebec (Quebec City), cap. of the prov. of that name, and formerly cap. of Canada, is situated on the l. b. of the St. Lawrence, at the mouth of the St. Charles R., 180 m. N.E. of Montreal. It is pic-

turesquely situated, occupying a promontory between 2 rivs., its citadel crowning the precipitous front of Cape Diamond, and is divided into 2 sections, an upper and a lower tn, the upper built entirely on the cliff, the lower spread out on the littoral surrounding Cape Diamond and up the valley of the St Charles R. The former is the residential, the latter the business portion of the city. The lower tn is characterised by winding, steep, and narrow streets, where may still be seen the strong stone houses built before the time of Wolfe. Q. occupies

of Mountain Hill, which occupies the site of the first Canadian Parliament, where the Pact of Confederation was signed in 1867; the Seminary Gardens, enclosing the site of the dwelling of Guillaume Couillard, son-in-law of Louis Hébert, the reputed first settler of Canada; and Dufferin Terrace covering the site of Château St Louis, the corner-stone of which was laid by Champlain in 1620. The château, in which Champlain died in 1635, was destroyed by fire in 1834. Among the existing houses dating from the Fr. regime and the first years of Eng. rule are the Kent House, built in 1650 by Governor d'Aillouboust; the Montcalm House, 1677 (erroneously believed to have been the scene of Montcalm's death); Montcalm's residence, situated on the ramparts and built in 1737, and occupied by Montcalm in 1758-9; the Judge Sewell House (1803); the Vallée House (1818); and the Garrison Club (1820) in St Louis Street. The fine Prov. Parliament Buildings are situated in extensive grounds, and among other noteworthy buildings are the city hall, court house, the imposing palace of the Rom. Catholic archbishop, the Rom. Catholic and Anglican cathedrals, the custom house, church hall, and the Ursuline Convent. The oldest church in the city is the Basilica of Notre Dame, which was built first in 1647, destroyed by fire and rebuilt thrice. After the fire of 1922 the architects took their inspiration for its remodelling from the Renaissance and Corinthian styles. Notre Dame des Victoires was built in 1688 and 1690. After the defeat of Philips, named Notre Dame de la Victoire; in 1711, after the defeat of Walker's fleet, it received its present name. It contains some very fine paintings and many memorial tablets. Another noted feature is the famous shrine of Ste Anne de Beaupré 20 miles from the city. The main educational institutions are Laval Univ., the Q. Seminary, and the Q. High School, whilst there are many benevolent and charitable institutions. The city is the seat of an R. C. archbishop and an Anglican bishop. Q.'s many monuments to the memory of discoverers, warriors, prelates, and statesmen include the Champlain (1898), which is on Dufferin Terrace, by Paul Chevré and Paul de Cardonel (both of Paris); the Wolfe-Montcalm obelisk in the du Fort Garden; the Laval, in front of the post office, erected in 1908 to the memory of Q.'s first bishop, and done by Philippe Hébert; the Cartier, in Montmorency Park (1920), by G. W. Hill; the Cardinal Taschereau, in the Basilica Square, by Vermare and Rolain (both of Paris), erected in 1923 to the memory of Canada's first cardinal; and the Cross of Sacrifice near St Louis Gate, erected in 1925 to the memory of the soldiers who fell in the First World War. A few miles above the city the Q. Bridge, a wonderful engineering feat, spans the St Lawrence. The bridge, of the cantilever type with suspended central span, has a total length of 3239 ft, the central span being



Canadian Pacific Railway

CHÂTEAU FRONTENAC, QUEBEC CITY

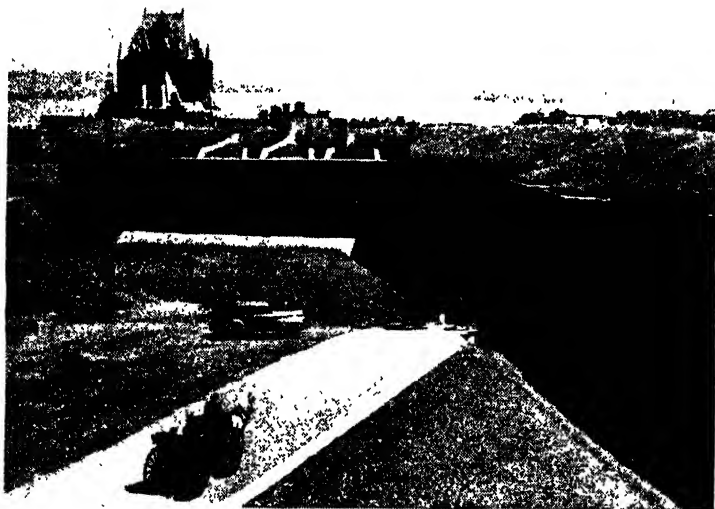
the most important military position in Canada, and its citadel has been termed the Gibraltar of Canada. By the beauty and number of its monuments and sites, by its old houses of an archaic style of architecture, by the absence of order in the planning of its ensemble, which lends it the appearance of some of the oldest cities of Europe, the city of Q., more than any other in America, had kept its old Fr. aspect and remained a paradox for the lovers of hist. and poetry. To the SW. are situated the Plains of Abraham, where a monument has been erected to Gen. Wolfe. The Plains of Abraham are situated in what is called the National Battlefields Park, which also comprises Avenue des Braves and the Park of Sainte Foy, where Lévis defeated Murray in 1760. Also situated to the SW. is Wolfe's Cove, where tradition says that Wolfe landed his troops in 1759 to take Montcalm by surprise. Among other historic sites are Montmorency Park, at the top

640 ft. The cantilever arms extend out over the water a distance of 1160 ft; the total width is 88 ft, taken up by 2 railway tracks, 2 footpaths, and a roadway, opened 22 Sept. 1929 for the accommodation of motor and horse-drawn traffic.

Electrical power is provided by the Montmorency Falls, a few miles distant, as well as by the vast Isle Maligne plant at the head of the Saguenay R. The prin. manufs. are iron, steel, and leather goods, clothing, boots and shoes, paper, tobacco, wooden ware, biscuits, etc., whilst timber is largely exported. Q. has

Doughty, *The King's Book of Quebec* (memorial vols. of tercentenary celebrations of July 1908), 1911; M. J. Pelton, *Natural Resources of Quebec*, 1923; W. Bovey, *Canadien*, 1933; and R. Traquair, *Old Architecture of Quebec*, 1947.

Quebec Act, 1774, Act of the Brit. Parliament 'to make more effectual provision for the government of the province of Quebec,' in effect of Canada. It extended the prov. boundaries of Quebec or Canada to include all the Old Northwest, which comprised the ters. bounded by the Ohio and Mississippi R.s and the S. boundary of the ters. granted to the



Canadian Pacific Railway
THE CITADEL, QUEBEC CITY

one of the largest dry docks in the world. It is a noted centre for the export of lumber and also of wheat. The deepening of the St Lawrence to Montreal has retarded the growth of shipping at Q., but the commerce of the city is considerable. In 1954 the total net registered tonnage of vessels entered at Q. was 5,859,540. The railway communication inland is good, and Q. is the head of ocean steamship navigation to Europe. It sends 4 members to the Legislative Assembly of the prov., and 3 to the Dominion House of Commons. Before the arrival in Canada of any European explorers, the Indians had chosen this exceptional site for the construction of an entrenched camp, which was visited by Champlain a few years before he founded Q. in 1608. Q. was captured by the Eng. in 1629 and again in 1759, and finally ceded to England in 1763. Pop. 187,000. See A. G.

Hudson's Bay Company in 1670; it substituted the Fr. civil code for the Eng. civil law; it gave freedom of worship to the Rom. Catholic Church in Canada and, in effect, endowed it by ordaining that the Rom. Catholic clergy should 'continue to receive their accustomed dues and rights.' But it made no provision for calling a 'legislative assembly,' deeming it expedient to continue government by governor and council. The granting of part of the W. ter. to Quebec and the recognition of the Rom. Catholic religion greatly angered the Amer. colonies, but the Act kept the Fr.-Canadians from making common cause with the Americans in the Amer. War of Independence. The motives for this legislation are not clearly estab.; some historians think that the purpose of the Act was essentially military, but others think that it was inspired by the

same liberal policies as have conduced to the steady evolution of the Brit. Commonwealth of Nations. The Act is still cherished by the Fr.-Canadians as the charter of their liberties. See R. Coupland, *The Quebec Act: a Study in Statesmanship*, 1925; H. Metzger, *The Quebec Act: a Primary Cause of the American Revolution*, 1936; and A. L. Burt, *A Short History of Canada for Americans*, 1942.

Quebec Marmot, see MARMOT.

Quéchua, or Quichua, anct Peruvian tribe whose original country was a dist. to the N. of the present dept of Ayacucho. Under the Inca sovereigns during the 13th and 14th cents. they subjugated all the country from Ecuador to Bolivia and Chile. They rose to a high state of civilisation, the gov. being a theocratic tyranny, and the king aided by an hereditary aristocracy; but the rule of the dominant caste was enlightened. Roads were made, the use of metals known, and the Q. excelled as architects. Their religion was a form of sun-worship. Writing was unknown, but hieroglyphics were used and records, etc., kept by a mnemonic system of knots in cords (see QUPUS). At the fall of the Incas the Q. submitted to the Spaniards. To-day they number about 2,000,000. They are agriculturists growing maize, potatoes, and other crops, and keep sheep, llama, and alpaca. They have stone houses and large communities with sev. official, secular, and religious classes. Though essentially Rom. Catholic by faith, their religious practices are tainted with pagan elements. See also J. H. Steward, *Handbook of South American Indians*, vol. ii, 1946.

Quéchua Language, see SOUTH AMERICAN NATIVE LANGUAGES, *Central Andean Plateau*.

Quedah, see KEDAH.

Quedlinburg, Ger. tn in the dist. of Halle, on the Hode, at the NE. foot of the Lower Harz Mts (q.v.), 42 m. NW. by W. of Halle (q.v.). It was founded as a fortress by Henry the Fowler (see HENRY I) about the year 922, and later belonged to the Hanseatic League (q.v.). It went to Brandenburg in 1698. The tn is overlooked by a medieval convent, and has a 10th-12th-cent. church, which contains the tombs of Henry the Fowler and his wife, Matilda. There are other anct churches, a Gothic tn hall, and remains of medieval fortifications. Q. has a plant-biological research centre, a horticultural industry, and manufs. of machinery and chemicals. Klopstock and Karl Ritter (qq.v.) were natives. Pop. 30,000.

Queen, Ellery, joint pseudonym of Frederic Dannay (1905-) and Manfred Lee (1905-), both b. Brooklyn, who collaborated in writing detective stories. Both were doing well in the advertising business when they entered together for a detective-story prize, and won it with *The Roman Hat Mystery*, 1929. For some time they took elaborate precautions to conceal their identity, even wearing masks at literary parties, but latterly this was abandoned, though the

pseudonym was retained. Among their novels, which are classics of their type, are *The French Powder Mystery*, 1930, *The Dutch Shoe Mystery*, 1931, *The Greek Coffin Mystery*, 1932, *The Siamese Twin Mystery*, 1933, *Halfway House*, 1936, *The Four of Hearts*, 1938, *The Tragedy of X*, 1940, and *Calamity Town*, 1942. Q. is the fictitious detective as well as the pseudonymous author, and 2 vols. of *Adventures of Ellery Queen*, 1934, 1940, have appeared. There is also an E. Q. monthly magazine, containing detective stories by various authors. See DETECTIVE STORY.

Queen, see CROWN; KING; SOVEREIGNTY; and individual articles on Q.s and kings.

'Queen, The,' estab. in 1861 by Mr Beeton, the husband of Mrs Beeton of cookery book fame. It is to-day a very modern magazine, dealing comprehensively with all matters of interest to women, from court and society notes and pictures to fashion from all over the world and art in all its spheres, with lavish illustrations throughout.

Queen Alexandra's Royal Army Nursing Corps, see MILITARY NURSING.

Queen Anne's Bounty, see BOUNTY, QUEEN ANNE'S.

Queen Charlotte Islands, archipelago in the N. Pacific, off the NW. coast of Brit. Columbia, Canada, from which it is separated by Hecate Strait on the E. and Dixon entrance on the N. It consists of c. 150 is., the main ones being Graham Is., Moresby Is., and Kungit Is. Lying in lat. 52° to 54°, long. 132° to 134°, they were discovered by James Cook in 1778. In 1787 Capt. George Dixon, R.N., explored the is. and named them after his ship, *Queen Charlotte*. The native inhab. are known as Halda and number some 5000. Minerals are known to exist. The people are chiefly engaged in lumbering, fishing, and game hunting.

There is another group of is. known as Q. C. I. in the S. Pacific Ocean, which were discovered by Capt. Cartwright. See F. Poole, *Queen Charlotte Islands*, 1872.

Queen Charlotte Sound, strait in the N. Pacific Ocean, dividing Vancouver Is. from the mainland and forming the first of a series of inlets along the N. and E. of the is.

Queen Consort, see CONSORT.

'Queen Elizabeth,' former Brit. battleship, launched Oct. 1913. It was the first battleship to dispense entirely with coal and to use oil alone; 643 ft long, 30,600 tons displacement; speed, 26 knots; turbines, 60,000 h.p.; guns, 8 15-in., firing a shell weighing nearly 2000 lb., and 16 6-in. When during the First World War the idea of attacking Turkey via the Dardanelles was being considered, it was thought that the guns of the Q. E. would be more than a match for the forts; but this proved to be erroneous, as some of the forts were so constructed that she could not reach them without exposing herself. After doing some good work she was recalled to England and subsequently

became Adm. Beatty's Grand Fleet flagship (1917-18). In the early years of the Second World War the *Q. E.* served in the Mediterranean, and was sunk in Dec. 1941 by limpet mines attached by It. 'frogmen'. She was raised and repaired, to become the Mediterranean fleet flagship, and in 1945 served off Burma as flagship of the E. Indies fleet. In 1948 the *Q. E.* was scrapped.

'Queen Elizabeth' (liner), *see* CUNARD STEAM-SHIP COMPANY.

Queen Elizabeth College, school of London Univ. (q.v.), originally a dept of King's College for Women. Founded 1908, since 1928 it has been a separate institution known as King's College of Household and Social Science until 1953, when a royal charter was granted and the name changed to Q. E. C. In 1915 the institution moved to its present site on Campden Hill; it prepares men and women students for the degrees of B.Sc. (Household Science) and B.Sc. (Nutrition).

Queen Elizabeth Islands (Canadian Arctic), group lying N. of Lancaster Sound, Barrow Strait, Viscount Melville Sound, and McClure Strait. Includes Parry and Sverdrup groups. Area 180,000 sq. m. *See* *Polar Record*, vol. vii, No. 49, 1955, p. 334.

'Queen Mary,' former Brit. battle-cruiser of *Lion* type; built by Palmers of Jarrow; launched in 1912; displacement 27,000 tons; 8 13.5-in. and 16 4-in. guns. Just before the battle of Jutland (q.v.) she was at Rosyth as a unit of the 1st Battle Cruiser Squadron under Beatty (q.v.). In the early stages of the battle she was hit by a salvo from the Ger. battle-cruiser *Derfflinger* which caused an explosion from which she sank with a loss of 1275 officers and men. There were 4 midshipman and 13 lower deck survivors.

'Queen Mary' (liner), *see* CUNARD STEAM-SHIP COMPANY.

Queen Mary College, school of London University (q.v.), emanating from the New Philosophical Institute founded in the early 19th cent. by J. T. Barber Beaumont (d. 1841). In 1887 the E. London People's Palace Technical Schools were opened, taking the place of the Institute, and later their name was changed, first to the E. London Technical College, then to the E. London College. In 1907 the college was recognised by the Univ. of London, and in 1915 it became a school of the Univ. In 1934 a royal charter was granted and the name changed to Q. M. C. in honour of Queen Mary, who presented the charter. The college is situated in the Mile End Road, and has over 1000 students.

Queen Mary Land, region of Antarctica, E. of Kaiser Wilhelm II Land, extending from 91° E. to 102° E., where it joins Wilkes Land. It was discovered and its coast-line charted by the Australasian Antarctic expedition of 1911-14 under Sir Douglas Mawson (q.v.). The W. coastal party of this expedition, when travelling from Mt Gauss to Haswell Is., 100 m. eastward, had to ascend to an

elevation of 2580 ft in long. 91° 30' E., and therefore this stretch of coast appears to be unapproachable from landward. From Cape Filchner, 66° 32' S. lat. and 91° 56' E., the coast trends eastward for nearly 50 m. to Helen glacier. The blight lying westward of this glacier is named Wright Bay. Haswell Is. is remarkable for its wonderful bird life, almost all varieties of Antarctic birds being found. Near the Is. is the largest Emperor penguin rookery known to exist. Denman glacier, flowing into the SE. side of Robinson Bay, is a major Antarctic glacier, its main channel being 9 in. wide. Its final descent to sea-level is by way of a huge ice-cascade, at the base of which it re-forms and presses through Shackleton shelf ice. The latter is an immense shelf of ice fronting the coast for over 160 m. eastwards from Junction Corner (the point where the W. side of the shelf meets the land ice-cap). Westward of Shackleton shelf ice and southward of the pack-ice belt, the Mawson expedition found open water during the summer months. This area was named Davis Sea, after a member of the Mawson expedition commanding the *Aurora*. The mainland S. of the shelf ice rises to about 3000 ft and is entirely ice-covered. Another large glacier is the Northcliffe, which flows into the SW. side of Robinson Bay. On the S. side of this bay, at a spot 200 ft above the surface of the Northcliffe glacier, Wild (*see* SHACKLETON) took possession of Q. M. L. for the Brit. Crown on 25 Dec. 1912. Among other is. off the mainland are Masson, Henderson, David, Bowman (700 ft, discovered in 1931 by the Brit., Australian, and New Zealand expedition), Mill (discovered in 1936 by the research ship *William Scoresby*) (*see* DISCOVERY COMMITTEE), and Drygalski (44 m. N. of Haswell Is., 1200 ft above sea-level and about 9 m. in diameter). *See* *The Antarctic Pilot* (Hydrographic Dept, Admiralty), 1948.

The Australian National Antarctic Research expeditions (1947-) continue exploration.

Queen Mary's Army Auxiliary Corps, the name given to a corps of women war workers formed in 1917 by the Army Council, when man-power was becoming seriously reduced, to provide women substitutes for certain male workers in units and offices administered by the Army Council at home and at the bases and on the lines of communication. They wore khaki uniform, and the number of officials and members enrolled was about 45,000, of whom 17,000 served in France and Flanders, while others were employed in Salonika, Italy, and Ireland. The corps, which was popularly known as the W.A.A.C.s, was disbanded early in 1920. Some 300 awards were made to members of the corps for long service and devotion to duty. In the Second World War the Women's Auxiliary Military Corps was known as the Auxiliary Territorial Service (A.T.S.). *See* WOMEN'S ROYAL ARMY CORPS.

Queen Maud Land, *see* DRONNING MAUD LAND.

Queen-of-the-Meadows, see MEADOW SWEET.

Queen Victoria (water-lily), see VICTORIA AMAZONICA.

Queen Victoria School, Dunblane, Perthshire, built as a memorial to Queen Victoria and men of the Army who fell in the South African War. The school educates and maintains without charge the sons of Scottish soldiers, sailors, and airmen. The age of entry is between 9 and 11 years, with a special entry at 12.

Queenborough, bor. of Kent, England, situated on the R. Swale, Isle of Sheppey. It is a deep-water port importing coal and exporting manufactured goods. Here the copperas factory was first estab. in England. There are pottery, chemical, and glue works. Q. has 13 royal charters, the first dated 1369. Pop. 3200.

Queens, bor. of New York City, covering an area of 108 sq. m. It was constituted in 1898, and the estimated pop. in 1950 was 1,550,849. It includes the former tns of Jamaica, Flushing, and Long Island City. It has many libraries and schools. Q. is connected with Manhattan by a web of bridges and tunnels; it has New York municipal airports, including La Guardia Field and New York International Airport. Its manufs. are concentrated in Long Island City. It has huge railroad yards, express terminals, and shipping facilities, as well as many residential areas (Jackson Heights, Forest Hills, etc.).

Queen's Bays, see GUARDS, DRAGOON; REGIMENT.

Queen's Bench Division, one of the 3 divs. of the High Court of Justice, the other 2 being the Chancery Div. (see CHANCERY) and the Probate, Divorce, and Admiralty Div. Theoretically all the divs. have jurisdiction in all matters both of common law (q.v.) and of equity (q.v.); but in practice the Q. B. D. deals principally with common-law actions for damages, actions for recovery of land (see EJECTMENT) or goods (see also DETINUE), applications for orders of *certiorari* (q.v.) and *mandamus* (q.v.), election petitions, and cases relating to the registration of electors. Certain business of the Q. B. D. is transacted by masters, and actions involving complicated questions of account are usually referred to an official referee (see also COMMERCIAL COURT). The court of king's bench, as it was once called, dates from about 1178 as a distinct tribunal from the *Curia Regis*, Henry II reducing the legal staff of the king's council to 5 judges, who were to sit *in banco* (bench) and nominally *coram rege*. Formerly the court followed the king, but from the time of Richard II it became fixed at Westminster Hall, and in recent times at the Strand, the king having from the early Tudor period ceased to preside in person even in those 'difficult cases' which were supposed to be reserved for royal hearing. James I, however, insisted sometimes on presiding over his courts, but the Stuart violations of law or constitutional convention were unique. The old king's bench court always had a

Crown side and a plea side. In the former it dealt with criminal and quasi-criminal matters, generally obtaining cognisance of purely civil suits through writs which alleged trespass *vi et armis* (by force and arms), whether force had been actually used or not (see also FRICTIONS). Its wide jurisdiction in applications for orders of *certiorari*, *mandamus*, and other *Crown Paper* cases is derived from this criminal jurisdiction (see also CROWN CASES RESERVED, COURT FOR). The Lord Chief Justice of England is the head of the Q. B. D., and there are 17 puisne queen's bench judges.

Queens' College, Cambridge, founded in 1448 by Andrew Duket under the patronage of Margaret of Anjou, queen of Henry VI, and refounded 17 years later by Elizabeth Woodville (Wydville), queen of Edward IV. The prin. court is one of the most beautiful and characteristic in Cambridge. Erasmus Tower is in the SE corner of Pump Court. Famous members include Bishop Fisher, Whitgift, and Erasmus.

Queens' College, London, pioneer college for the higher education of girls, founded in 1848 by Frederick Denison Maurice with the active interest of Queen Victoria; incorporated by royal charter in 1853, this charter being the first ever granted by an Eng. sovereign solely for the furtherance of women's education.

Queen's College, The, Oxford, founded in 1340 by Robert Eglesfield, chaplain to Philippa, queen of Edward III, after whom the college is named. Famous members include Wycherley, Addison, and Bentham. See R. H. Hodgkin, *Six Centuries of an Oxford College*, 1949.

Queen's Council, see CURIA REGIS.

Queen's (or King's) Counsel, those barristers of the Eng. Bar who wear silk gowns and sit 'within the Bar.' Hence colloquially called 'silks.' They take precedence of 'juniors,' i.e. all who wear stuff gowns and sit outside the Bar. Formerly, patents of precedence were granted to K. C. and Q. C. by the Crown, but that custom has been in disuse since the early 1900's. Q. C. rank next in precedence after the leaders of the Bar, the attorney-general and solicitor-general, and are called Q. C. or K. C. apparently for no other reason than the fact that their full style is 'Her Majesty's counsel learned in the law.' They may not hold briefs in any cause against the Crown without special licence. It is the almost inviolable etiquette of the profession that Q. C. should never appear with a brief in a civil action without a 'junior,' the only exception to this rule being when a 'leader,' or Q. C., is retained for a plaintiff suing *in forma pauperis* (q.v.). Even in criminal cases it may be stated as a general rule that a leader cannot hold a brief without a junior. The leader has the conduct of the case, but the junior settles the pleadings, writes the 'advice on evidence,' and settles interrogatories or other documents in the interlocutory proceedings. In court the leader frequently invites the junior to examine the first witness.

Sometimes the junior conducts the case almost throughout, the leader being engaged elsewhere.

Queen's County, *see* LEIX.

Queen's (or King's) Evidence. Where one of sev. persons jointly charged with a crime gives evidence so as to secure the conviction of his accomplices, such evidence is called Q. E. It is customary for the committing magistrate, where the evidence for the prosecution is weak, to hold out a hope of acquittal to any co-defendant who can and will give such evidence as will supply the want of sufficient evidence for the prosecution. At the trial, however, it is necessary to obtain the sanction of the judge to such a course. It is to be observed that counsel for the prosecution may, where necessary, obtain the consent of the judge at the trial to put one of the co-defendants in the box, and thus secure his acquittal, even without any suggestion of such a course from the committing magistrate. In any case, Q. E. is to be looked at with suspicion. It is the practice, though not legally necessary, to require the evidence of an accomplice to be corroborated in some material part by independent evidence, and such confirmatory evidence ought to go far enough to identify the prisoner so turning Q. E. with those of his accomplices who remain in the dock. *See* Harris, *Principles of Criminal Law*; Russell, *On Crimes*; and Archbold, *Practice*.

Queen's Metal, alloy, of which the chief ingredient is tin. It is similar to Britannia metal, and answers the same purposes, being somewhat harder than pewter; the proportion of the ingredients varies.

Queen's Own Royal West Kent Regiment, *see* WEST KENT REGIMENT, QUEEN'S OWN ROYAL.

Queen's Printers are the holders of the patent for printing the Bible and the Book of Common Prayer. The first holder of an Eng. Bible patent was Richard Grafton, who in 1537 was licensed to publish 'Matthew's' Bible. In 1549 he was granted the patent for the Book of Common Prayer. This monopoly has much contracted, since, for instance, the King's Printer of the Authorised Version of 1611 had the right also to print Acts of Parliament, royal proclamations, etc. Since 1770 the patent has been continuously held by the Eyre family, of whom the present representative is Col. O. Crowthwaite-Eyre of Eyre & Spottiswoode.

In England the Univ. Presses of Oxford and Cambridge enjoy the privilege of freedom to print the Bible and the Book of Common Prayer. There is a separate patent for Scotland.

Queen's Prize, *see* RIFLE SHOOTING.

Queen's Proctor represents the Crown (q.v.) in admiralty and matrimonial causes. The Treasury solicitor holds the office at the present day, and that functionary is generally a barrister. He intervenes to stop decrees nisi in divorce being made absolute on the ground that all the material facts have not been before the court, or where he detects collusion, or at any stage of divorce proceedings where it

would be against morality to dissolve the marriage tie. He has the right to see letters, briefs, and all other documents in divorce cases, whether privileged or not (*see* CONFIDENTIALITY). The judge has power in any petition for dissolution or nullity suit to order all necessary papers to be sent to the Q. P. that the latter may, under the direction of the attorney-general, instruct counsel to argue any point in the case which the judge thinks ought to be fully argued. The court may order the parties or any one of them to pay the costs of intervention.

Queen's Regulations, the official regulations for the organisation of the Army. The 1955 issue comprises 1697 articles and 27 appendices dealing with the organisation or composition of the Army; duties of commanders; duties of the general staff; appointment and promotion of officers; service, promotion, employment, and discharge of soldiers; discipline and courts-martial; training and education; ceremonial; uniforms and equipment; movement of troops, etc. They are amended as necessary by army orders.

Queen's Remembrancer, *see* REMEMBRANCER.

Queen's Royal Lancers, 9th, raised (as Wynn's Dragoons) to put down the Old Pretender's rising in 1715. Became 9th Dragoons in 1719. The queen from whom they take their title was Adelaide, consort of William IV. During 17 years' continuous service in India, which included the mutiny, the 9th Lancers won 14 V.C.s. They fought in the Afghan war of 1878 and throughout the S. African war. They formed part of the original B.E.F. (q.v.) in 1914, and were engaged at Mons. They were converted to light tanks in 1935. In 1940 they arrived in France in time to take part in the campaign, were evacuated, re-equipped, and went to the W. desert in 1941. Also fought in the It. campaign from May 1944 onwards. *See* also LANCERS; REGIMENT. *See* Maj. E. W. Sheppard, *The Ninth Queen's Royal Lancers, 1715-1936*, 1939.

Queen's Royal Regiment (West Surrey), The, the old 2nd Foot, raised in 1661 for service in Tangier, and under Charles II called the Tangier Foot. It was made a royal regiment by William III. Its roll of honours is a long one, it having participated in operations in Tangier (1662-80), Namur (1695), Egypt (1801), Peninsula (1808-14), Afghanistan (1839), S. Africa (1851-3), China (1860), Burma (1885-7), S. Africa (1899-1902). It was granted naval buttons in commemoration of its service in Lord Howe's fleet on the Glorious 1st June, 1794. During the First World War it raised 25 battalions, which served in France, Flanders, Italy, Gallipoli, Egypt, Palestine, Mesopotamia, and NW. Frontier, India. The regiment also fought in the Third Afghan war of 1919. In the Second World War 3 battalions formed the 168th Brigade of the famous 56th London Territorial Div. and served in N. Africa. They took part in

the landing in Salerno Bay (Sept. 1943) and later fought on the Garigliano R. and in the debouchement into the plain of the Po. They attacked on 11 April 1944 along the shore of Lake Comacchio and took Bastia, and then, crossing the Lower Adige, reached Gorizia (1945), when the campaign ended. Other units of the regiment fought in Burma and the battle of Normandy. The Q. R. R. and the East Surrey R. are to be amalgamated by 1959. See Lt. Col. J. Davis and others, *The History of the Queen's Royal Regiment*, 8 vols., 1887-1953.

Queen's University, Belfast, founded in 1845 as Queen's College, Belfast, part of the Queen's University of Ireland, which had other constituent colleges at Cork and Galway. It received its charter as a separate univ. in 1908 (following the Irish Convention Act of that year, which also instituted the National University of Ireland, q.v.). There are faculties of arts, science, law, medicine, economics, agriculture, applied science and technology, and theology. A new assembly hall was opened in 1949; a new geology block and a new Institute of Clinical Science were opened in 1954. A building programme is in progress to provide new departments for civil engineering, chemistry, botany, zoology, aeronautical engineering, and physics, and should be completed by 1960. There are nearly 3000 students.

Queen's Ware, see CREAM-COLOURED WARE.

Queensberry, Earls and Marquesses of, Scottish titles, borne by the Douglas family. Sir Wm Douglas of Drumlanrig, Dumfriesshire, was created first earl of Q. in 1633 by Charles I. This Douglas traced his descent from the Douglas who was slain at Otterburn. The third earl, whose name also was Wm, was an important personage in the hist. of Scotland during the latter half of the 17th cent. In 1680 he was lord chief justice of Scotland, and he was created in turn marquess (1682) and duke (1684). He did not share the Catholic sympathies of James II, with the result that 2 years before the revolution he was deprived of all his offices. His son, the second duke, who was also created Duke of Dover, joined William of Orange and fought for him in Scotland. He ultimately became the keeper of the privy seal. He was one of the king's commissioners to Scotland after the failure of the Darien scheme, and ultimately became one of the joint secretaries of state for Scotland. He was implicated in a Jacobite plot, and compelled to resign his offices; but in 1705 he resumed them, and after the union was practically the director of all Scottish affairs. He received, in addition to the dukedom of Dover, the titles of Marquess of Beverley and Earl of Ripon. His son, the third duke, married a daughter of the Earl of Clarendon; but with his decease the Brit. title became extinct, and the dukedom of Q. passed to his cousin Wm, Earl of March. He became known as Old Q., and was a well-known character of

the latter end of the 18th cent. He was a great supporter of the turf and the opera. He d. without legitimate issue, and his honours and titles passed to various members of his family. The Duke of Buccleuch received the dukedom, Sir Charles Douglas became Marquess of Q., and the title of Earl of March passed to the Earl of Wemyss.

Queensberry, John Sholto Douglas, eighth Marquess of (1844-1900), authority on the rules of the prize ring, of which he was a great patron. He was the originator of the famous Q. rules which govern prize contests at the present time. See also WILDER, OSCAR.

Queensbury, part of the urb. dist. of Q. and Shelf in the W. Riding of Yorks, England, 4 m. N. of Halifax. Textiles are made and stone quarried. Pop. (with Shelf) 8910.

Queenscliff, seaside tn and port in Victoria, Australia, situated on Port Phillip Bay.

Queensferry, or South Queensferry, royal burgh and coast tn of W. Lothian, Scotland, on the frith of Forth, 8 m. NW. of Edinburgh. At this point the ferry was formerly the prin. means of communication between Edinburgh and the N. of Scotland, and here is the famous Forth Bridge. The harbour is good and always accessible and there are 2 piers. The naval base of Port Edgar is at Q. There is a whisky-blending estab. in the tn as well as large oil-works in the vicinity. Abercorn, to the W. of Q., was the site of an anct. monastery, and from 681 to 685 the see of the earliest bishopric in Scotland. Other buildings of note are a Carmelite priory and Dundas Castle. Pop. about 2500.

Queensferry, North, vill. of Scotland, in Fifeshire, situated on the Forth, at the end of the Forth Bridge. It is the N. terminus of the ferry passage and has whinstone quarries. Pop. 1200.

Queensland, NE. state of the Commonwealth of Australia (q.v.), situated between 10° 4' and 29° S. lat. and 138° and 153° 30' E. long.; it includes the adjacent is. in the Pacific Ocean and in the Gulf of Carpentaria. It is the second largest state of the Commonwealth, the area being 670,500 sq. m. Q. was included in the colony of New S. Wales from 1788 to 1859. The coast-line, which is about 2250 m. in length and has many good harbours, is bordered by the Great Barrier Reef as far as 22° S. lat. The reef extends from near Port Curtis to the coast of New Guinea, and is impassable except through narrow channels, which are separated by considerable intervals.

Physical Features. The surface of the country is fairly flat to the W. of the mts, the soil being very rich and eminently suited for pasturage. The Main Dividing Range is a coastal range of old rocks which runs N. and S. from New S. Wales to Cape Melville, being a continuation of the Australian Alps of Victoria and the Blue Mts of New S. Wales; the highest peaks are Bartle Frere (5287 ft) near Cairns, Bellenden Ker (5320 ft), also near Cairns,

Mt Dalrymple (4250 ft), and Mt Lindsay (4046 ft), whilst the average height of the range is 2000 ft. To the N. of Cape Melville the coastal range yields to a flat ridge capped with sandstone, which runs through Cape York Peninsula and gradually declines in elevation until it reaches Cape York. The great W. plain extends from the coastal range to the S. Australia border, and from New S. Wales to the Gulf of Carpentaria. Two main watersheds of low elevation stretch from the coastal range westward; these include fertile riv. valleys covered with excellent soil. The rivs. which flow from the Dividing Range flow E. to the Pacific, NW. to the Gulf of Carpentaria, W. to the interior, and S. to the Murray-Darling system. From the southerly part of the coastal range flow the Albert, Brisbane, and Logan R.s., all emptying into Moreton Bay, the Burnett and Mary, which flow into Hervey Bay, and the Boyne into Port Curtis. The Darling Downs, lying W. of the range, are drained by the Condamine and its affluents; while the SW. plains are drained by the affluents Maranoa, Warrego, and Paroo R.s., all flowing into the R. Darling. Northward of the more southerly watershed the Comet, Dawson, and Nogoa R.s. join the Mackenzie and Isaac R.s. and, flowing southward, form the northerly watershed, the Fitzroy, emptying into Keppel Bay. The Burdekin, the chief riv. of N. Q., flows southward, and after being joined by the Belyando and Sutor empties into the Pacific near Cape Upstart by a mouth obstructed with sandbanks. Other rivs. farther W. are the Barcoo, Diamantina, and Georgina, the latter 2 having their source in the Barkly Tableland. The Herbert, Johnstone, and Mulgrave R.s. rise from the E. slope of the NE. coast range; the Gilbert, Lynd, and Palmer R.s. from the W. slope, flow into the Gulf of Carpentaria. Yet farther W. are the Norman, Flinders, Leichhardt, and Albert R.s., also flowing into the Gulf of Carpentaria. None of the rivs. is navigable for a great distance; those flowing into the Gulf of Carpentaria are of little use to navigation at all, while those flowing into the interior are lost in the desert or its salt lakes.

Climate and Rainfall. The climate of Q. presents great varieties, being tropical and sub-tropical, but on the whole very healthy. The summer heat is great, but is not aggravated by the hot winds found in other countries. The climate is regarded as effectual in checking pulmonary diseases. The rainy season extends from about Christmas-time until March. The precipitation on the E. coast amounts to as much as 135 in. a year at Innisfail, but is no more than 40 in. S. of Port Curtis. The average rainfall of the Darling Downs is about 35 in., and on the W. border about 8-9 in. Since 1883, when a hydraulic engineer's dept was organised, the W. plains have everywhere been tapped by artesian wells, the waters of which are suitable for stock, irrigation, and household purposes in some cases;

in others for only one or two of these purposes.

Fauna and Flora. The fauna and flora of the state are typically Australian. The forests of Q. are extensive, eucalyptus, pine, walnut, cedar, yellow-wood, silky oak, tulip-wood, and beech being grown.



Queensland Government

BARRON FALLS, NORTH QUEENSLAND

Products. The mineral wealth of Q. is great, and among the minerals found, though in varying quantities, are gold, silver, copper, coal, tin, lead, zinc, limestone, opals and gems, pyrites, fluorspar, fireclay, zircon-rutile-monzonite concentrates, and uranium ore. The most important sources of gold are now those in Mt Morgan and Cracow (120 m. inland from Maryborough). Copper is found in Mt Isa and Mt Morgan. Ipswich is the main coalfield, followed by Callide, Blair Athol, Bowen, and Maryborough. Most of the tin is alluvial, the chief source being the Atherton Tablelands, N. Q. Zircon-rutile-monzonite is produced from beach deposits of the SE. coast. Mineral production has always yielded the state a fairly large income. By 1873 its ann. value exceeded £1m. From 1905 to 1918 the value (excluding quarry products) reached over £4m. in some years, and was always at least £3m. It then fell to a relatively low level from 1921 to 1931, in most of these years not reaching £2m. Increasing activity during the 1930's raised the value from £1.3m. in 1931 to

£5-1m. in 1940. High post-war prices of metals raised the value of mineral output to £23-1m. in 1952 and to a record level of £26,928,870 in 1954. The output and value of the chief minerals during 1954 were as follows: gold, 98,754 oz. (£1,638,172); coal, 2,760,810 tons (£6,418,388); copper, 27,747 tons (£8,771,738); tin, 730 tons (£538,015); silver, 3,409,439 oz. (£1,294,261); lead, 40,714 tons (£4,919,641); zinc, 19,615 tons (£1,912,208); zircon-rutile-monazite concentrates, 32,136 tons (£890,836). Total value of all mineral production during 1954 was £26,928,870.

The Mary Kathleen Mine, a very important source of uranium, was discovered in NW. Queensland in June 1954. It is situated some 500 m. from the coast at Townsville and about 40 m. from Mt Isa, where a large mining industry is already estab. The U.K. Atomic Energy Authority has entered into a contract with Mary Kathleen Uranium Ltd. to buy a number of years' uranium concentrates produced in the mine. The total value of the material to be delivered under the contract is expected to exceed £30m.

The land between the coast range and the ocean is, generally, very fertile. It was formerly covered with jungle or rain-forest, locally termed 'scrub.' Large tracts, however, are mere waste. Westward of the coast range the state land is open forest country or downs very suitable for wool-growing. Here, the rainfall being adequate, cattle are pastured in large numbers. The introduction of prickly pear into Australia in 1788 and 1824 has notoriously proved to be disastrous to the Commonwealth, and to no state more than Q., but happily the unremitting efforts of biologists have resulted in counteractive measures which have won back large areas to cultivation, the most promising destructive agents being the *Cactoblastis* (genus of pyralid moth) and the *Coccus indicus* ('wild cochineal'). The prin. crops are sugarcane, maize, wheat, sorghum, green forage, hay, peanuts, potatoes, pumpkins, tobacco, orchard fruit (apples, peaches, apricots, custard apples, plums, etc.), plantation fruit (bananas, papaws, pineapples), vegetables (beans, tomatoes, etc.). The production of sugar-cane is the leading feature of Q. agriculture, and it occupies most of the riv. flats and fertile valleys near the coast. Irrigation is practised at Inkerman and in the Bundaberg area; cultivation is intensive, and the production per acre is high. The production of sugar per acre of cane grown has increased with greater efficiency. The high price of cotton during the Amer. civil war estab. cotton-growing in Q. in 1861-5, but after 1871 the industry rapidly declined and revived only in 1920-3. During the year 1953-4 about 8965 ac. were harvested for a production of a little over 5,000,000 lb. of seed cotton. The present production of cotton comes for the most part from the Rockhampton and Maryborough

divs., particularly in the Callide Valley and Upper Burnett. Grain sorghum, a summer-growing crop, has made rapid strides in Q. in recent years. The gross value of the leading crops for the year 1952-3 was: sugar, £28,931,718; wheat, £15,400,825; sorghum, £2,285,507; green forage, £2,509,533; hay, £1,971,763; tomatoes, £1,663,171; pineapples, £2,461,255; and tobacco, £1,384,701. As at 1953, 27,749,000 ac. of the total area of the state were alienated. Both unconditional and conditional selection of land is allowed, the latter being the more general. Some 401,371,000 ac. remain the property of the Crown. Land is made available for selection in: (a) pastoral leases; (b) occupation licences; (c) grazing farms and homesteads; (d) perpetual leases; (e) forest grazing leases; and (f) leases for special purposes. The largest area that may be acquired by any one person as a perpetual-lease selection is 2560 ac. A number of pastoral properties are still held in large leases, areas of 500 sq. m. being not uncommon for sheep, and for cattle 1500 sq. m. or more, particularly where the country is far removed from the railway or is rough or dry country with a lower stock-carrying capacity. Grazing selections represent the closer settlement of the more accessible and better-quality pastoral lands, and are made available in areas of about 20,000 ac. for sheep and up to 60,000 ac. for cattle. Grazing homesteads and grazing farms have a term of lease up to 28 years in 7-year periods. A large proportion of the area is leased in squatting runs for pastoral purposes, amounting to 249,215,000 ac. in 1953, besides 88,587,000 ac. in grazing selections. Total numbers of live stock as at 31 Mar. 1954 were: cattle, 7,086,207; sheep, 18,193,988; horses, 273,180; and pigs, 384,453. The wool production, expressed as greasy, was, in 1943-4, 194,354,517 lb. (£12,655,677); in 1950-1, 154,867,000 lb. (£88,818,000); and in 1952-3, 163,149,000 lb. (£59,903,000).

The quantity of wood cut in the various saw-mills in 1952-3 was (in superficial ft): pine, 71,410,000; other woods, 222,942,000; total value £12,678,000. Value of plywood and veneer produced was £2,680,000. In 1952-3 there were 4,597,000 ac. of permanent State Forest reservations. A high proportion of the secondary industries are works for processing primary products, among them being sugar mills, butter factories, saw-mills, and meat works. The establishment of new secondary industries is being encouraged by the State Gov., and heavy industries such as shipbuilding and the construction of locomotives are in operation. The value of production in 1952-3 was £98,209,000. The gross value of Q.'s primary production during the same period of 12 months was £189,463,000. Wool is easily the most valuable single item of the state's overseas exports, followed by sugar, meat, and butter. Q.'s overseas exports in 1952-3 were worth £145,098,044, compared with

£28,651,842 in the pre-war year 1938-9. The U.K. took £74,636,477, or 51·4 per cent of the 1952-3 exports, compared with £21,148,625, or 73·8 per cent, in 1938-9. In 1952-3 the U.K. took £7,189,849 or 71 per cent of the frozen beef, £13,666,513 or 24·3 per cent of the wool, £7,400,881 or 68·9 per cent of the butter, £16,782,851 or 78·9 per cent of the sugar, and £8,655,673 or 61·4 per cent of all minerals. Large items of export to foreign countries in 1952-3 were wool, £42,408,057 (principally to Japan, France, U.S.A., Italy, Belgium, and Germany), compared with £5,139,394 in 1938-9, and minerals £5,249,480, compared with £491,631 in 1938-9.

Because of import restrictions imposed by the Commonwealth Gov. following Australia's adverse trade balance in 1951-2, Q.'s overseas imports in 1952-3 decreased by £43,205,046. Nearly all items were reduced by large amounts, the only important ones showing increases being railway vehicles, tea, petrol, and kerosene. Oversea imports from the U.K. in 1952-3 compared with the pre-war year 1938-9, in brackets, were £18,116,339 (£4,251,584); from other Brit. countries £18,553,471 (£1,542,163); and from foreign countries £18,551,892 (£4,170,915). The total value of imports from the U.K. was over 4 times as great as in 1938-9, due mainly to machinery and appliances, hardware and metal manufs. and motor vehicles. Imports from other Brit. countries were 4 times as great, due principally to manufactured fibres, tea, motor vehicles, petrol, rubber goods, and textiles and piece goods, while imports from foreign countries were over 4 times their 1938-9 value, due mainly to petrol, machinery and appliances, hardware and metal manufs., oils and kerosene. Interstate exports in the year ended 30 June 1953 were £50,762,640, and the value of imports during the same period was £92,890,827.

Education, Constitution, etc. Education is free and compulsory and secular, the public expenditure in 1952-3 being £8,210,744. There are 1536 state primary schools, including intermediate and rural, with an enrolment of 173,341; 26 state high schools and 18 high depts attached to primary schools, with an enrolment of about 8566. There is also a correspondence school and a number of private grammar schools. The state-aided univ. of Q., at Brisbane, was estab. by an Act of 1909 and opened 14 Mar. 1911. There are now 11 faculties, granting degrees in arts, law, engineering, commerce, agriculture, dentistry, veterinary science, medicine, science, architecture, and education. Diplomas are awarded in education, physiotherapy, physical education, mechanical and electrical engineering, music, journalism, commerce, and architecture, and certificates are awarded in education, architecture, and accountancy. Students number some 4000. There are 19 technical schools with 21,306 students. Correspondence courses are conducted by a Technical

Correspondence School. Responsible gov. was conferred on Q. in 1859 when the state was separated from New S. Wales. Legislation is vested in a Parliament of one House, the Legislative Assembly, which comprises 75 members, returned for 3 years and paid at the rate of £2500. There is a male and female adult franchise. Electoral enrolment is compulsory for all persons, 21 years of age and over, who are Brit. subjects by birth or naturalisation and who have lived in Australia for 6 months, in Queensland for 3 months, and in an electoral dist. continuously for 1 month. Before 1922 there was also a legislative council, but this was abolished. There is a governor and lieutenant-governor, with an executive council of ministers, each of the latter receiving a salary of £3080 a year. The net revenue of the state in 1954-5 was £73,819,723, and expenditure £73,602,000. There is no state church in Q., and the religious bodies, in their numerical order, are Church of England, Rom. Catholic, Methodist, Presbyterian, Lutheran, Baptist, and Congregational. The prin. denominations retain free of charge the valuable lands granted to them before 1861. There are 6560 m. (1953) of Gov. railway open in the state, with a gauge of 3 ft 6 in. Quadruplication work on suburban railways is being carried out as the first step in Brisbane's rail electrification scheme.

The cap. is Brisbane, pop. 515,000. Other cities, with pop. as at 30 June 1955: Toowoomba, 44,000; Rockhampton, 41,300; Townsville, 41,200; Ipswich, 40,100; Cairns, 21,400; Bundaberg, 20,400; Mackay, 18,503; Maryborough, 18,210; Gympie, 10,000; and Warwick, 9370. Prin. tns with pop. as at 1954 census: South Coast, 19,689; Redcliffe, 13,785; Mount Isa, 7428; Ayr, 7079; Gladstone, 6988; Charters Towers, 6965; Innisfail, 6640; Dalby, 6179; and Nambour, 4679. There are many ports, but the contour of the coast-line and the relative position of the inland dists. militate against any centralisation similar to that at Melbourne, Sydney, and Adelaide. The total pop. of Q. in June 1956 was 1,370,697.

History. Q. was visited by Capt. Cook in 1770, but little was known of the country until 1823, when Surveyor-General Oxley discovered the R. Brisbane. Cook landed at Round Hill Head, the S. point of Bustard Bay, and an obelisk with commemorative tablet has been erected on this spot. The Federal authorities have also placed a commemorative obelisk on Possession Is. in Endeavour Bay, where Cook formally took possession. The first settlement was at Moreton Bay in 1824, but in 1842 the penal settlement was finally broken up, and from that year free settlers were admitted to the country, since when progress has been remarkably rapid, though checked during the depression of 1931. Pastoral occupation of the Darling Downs was commenced in 1840, and the Mary R. was occupied in 1843;

but the aborigines murdered the sheep herds, and so prevented permanent settlement for many years. A surveyor, J. C. Burnett, while seeking an overland route to the N. Australian settlement at Port Curtis, discovered the riv. which now bears his name, and 2 years later Wide Bay and Burnett dists. were settled. In the same period Warwick and Drayton on the Darling Downs were surveyed, and Maryborough on the Mary R. was settled in 1848. The first emigrant ship direct to Moreton Bay was the *Artemisia*, which arrived in 1848. A noted name in Q. exploration is that of Leichhardt, whose journey to Port Essington in 1844-6 resulted in making known the existence of the Dawson, Comet, Mackenzie, and other rivs. Another notable explorer was Sir Thomas Mitchell, who visited the Maranoa and Warrego dists. in 1846-7. Ten years later squatters founded stations in the country, around Rockhampton. There were many murders of squatters by the 'blackfellows,' but a force of black police, organised in 1848, afforded much protection. The progress made by settlers led to the separatist movement, and the N.E. part of the colony of New S. Wales (as it then was) was created a separate colony with the name of Q. by letters patent of 8 June 1859. The fatal journey of the celebrated Burke and Wills, and the relief expedition of John McKinlay, W. Howitt, and others, opened up the W. dists. between the Gulf of Carpentaria and the S. Australian border, and many pastoral settlements were made on the Warrego and Flinders R.s. Gold was discovered in 1868 at the head of the Mary R., where the Gympie field came into existence. Droughts have not seldom hampered the progress of Q., as in 1901. Political unrest ensued after this occurrence, and a Labour party made its appearance in the House. This party came into office in 1915, and among the changes it effected was the abolition of the legislative council in 1921. The Country Liberal party displaced the Labour party in August 1957.

See M. Flinders, *A Voyage to Terra Australis* (containing an account of his investigation of the Great Barrier Reef), 1814; Sir T. L. Mitchell, *Tropical Australia*, 1848; W. Coote, *History of Queensland, 1770-1881*, 1882; J. W. E. Roth, *Ethnological Studies among North-west Central Aborigines*, 1897; Palmer, *Early Days in North Queensland*, 1903; O. A. Bernays, *Queensland Politics during Sixty Years*, 1919, and *Our Seventh Political Decade*, 1932; R. L. Jack, *Northernmost Australia*, 1921; E. G. Brady, *The Land of the Sun*, 1924; F. Clune, *Free and Easy Land*, 1938; F. Ratcliffe, *Flying Fox and Shifting Sand*, 1938; G. H. Wilkins, *Undiscovered Australia*, 1938; and the *Queensland Year Book*.

Queenstown: 1. Tn of Cape Prov., S. Africa, on a 3500-ft plateau near the Great Kei R., 163 m. by rail from East London. It is the centre of one of the richest wool-producing areas in S. Africa,

and the social, educational, and commercial centre of the Cape E. area. Q. was founded in 1863 as a link in the chain of border outposts, and the central feature is a hexagon originally intended as a rallying point in case of native disturbances, but now a garden. Pop.: Whites, 9017; Bantu, 14,761; Coloureds, 2204; Asiatics, 122.

2. Tn of Tasmania, Australia, in Montague co., on the Queen R., 22½ m. by rail from Strahan, its port. The most important mining dist. of the state, the chief ores mined and commercially utilised being copper, silver, and gold; the ann. copper production is 10,000 tons. The Mt Lyell Mining and Railway Company Ltd. is the pre-eminent enterprise. Pop. 4526.

3. See COBH.

Queirós, José Maria Eça de (1845-1900), Portuguese author, b. Póvoa de Varzim, son of a retired judge, educ. at the univ. of Coimbra. He attracted attention by his writings for the *Gazeta de Portugal*, but soon he left Lisbon for Évora, where he became editor of the *Diário de Évora*. It was in this backward place that he learned manners, customs, and superstitions quite different from those of the big cap. In 1875 his greatest book, *The Sin of Father Amaro*, appeared as a feuilleton in the *Revista Occidental*, and was pub. in book form in 1876. It is an attack on the manners and morals of the priests in a prov. tn, and was an immediate success. The Rom. Catholic Church put it on the Index. For many years his heirs did all they could to prevent the book being disseminated, but in 1930 a complete trans. into German was pub. in Berlin. The rest of Q.'s official life was spent in the consular service at Bristol, England (1876), Havana, and Paris, in which latter city he d. He collaborated in *As Farpas* (satirical sketches) and also wrote *Nepheu Basilius*, a chronicle of the Lisbon family life, pub. in 1878; the fantastic novel, *The Mandarin*, 1879; *The Matas* (episodes from the romantic periods of Portuguese hist.), 1880; and *The Celebrated House Hamires*, 1900. *The Italic* was pub. in 1877 and was also placed on the Index. His short stories are particularly admired. *The Sweet Miracle* has been trans. into both Eng. and Irish.

As a writer Q. started out as a romantic, specially fascinated by the irony of Heine and the flaming verses of Victor Hugo. Later his outlook was changed by his admiration for Flaubert. He is considered the greatest recent Portuguese writer, and is certainly the only one whose books have been thought worthy of trans. into many languages.

Quelimane, or Kilimane, port of Portuguese E. Africa, on the Q. R.; cap. of Zambesia dist. and an agricultural centre, connected by railway with Mocuba 100 m. to the N. Exports: cotton, maize, sisal, tobacco, and tea. Big game is plentiful, but can be hunted only by licence. Pop. (dist.): native, about 1,000,000; white, 1200.

Quelpart (Korean *Tayetsyn*), is. of volcanic origin, about 45 m. long and 21 m. broad, lying SW. of Korea at the entrance to the Yellow Sea; discovered by the Dutch. Pop. 150,000.

Quenehning, see **METALLURGY**.

Quennell, Peter Courtney (1905-), poet, critic, and biographer, b. London. Educ. at Berkhamstead and Balliol College, Oxford, he worked as a freelance writer in London. In 1930 he was Prof. of Eng. in Tokyo Univ., and wrote *A Superficial Journey Through Tokio and Peking*, 1932. Back in London, he became ed. of the *Cornhill Magazine* in 1944. His books of verse are *Masques and Poems*, 1922, and *Inscription on a Fountain Head*, 1929. *The Phoenix-kind*, 1931, is a novel, and *Sympathy*, 1933, a vol. of short stories. But he is best known for his biographies, *Byron: the Years of Fame*, 1935, and *Byron in Italy*, 1941, together with *Caroline of England*, 1939, and *John Ruskin, the Portrait of a Prophet*, 1949. *Four Portraits*, 1945, contains studies of Boswell, Gibbon, Sterne, and Wilkes, and *The Singular Preference*, 1952, is a book of

Quercia, Jacopo della, see **DELLA QUERCIA**.

Quercin, or **Quercotte**, saccharine substance obtained from the liquid extracts of acorns.

Quercus, genus of deciduous and evergreen trees (see **OAK**).

Queroy, name of an anct dist. in S. France, forming the present depts of Tarn-et-Garonne and Lot. It was so called from the Cadurci, a Gallic tribe, and gave its name to cadurcum, a light linen.

Querétaro: 1. Central state of Mexico, enclosed by Mexico, Michoacán, Guanajuato, San Luis Potosí, and Hidalgo States, on a plateau between tribs. of the Lerma and the Tollman-Pánuco. It has silver, mercury, and copper mines. Cottons, grain, fruit, textiles, pottery, and iron ware are produced. Area 4432 sq. m. Pop. 286,238.

2. Cap. of the above state, 50 m. from Guanajuato and 167 m. NW. of Mexico city by the Central Mexican Railway. It is interesting historically, not only as the site of a pre-Aztec settlement but as the bp. of Mexican independence. It was captured by Sp. conquistadores in 1536 and made a city in 1655. In 1848 it was the venue of a congress by which peace between Mexico and the U.S.A. was ratified. In 1867 the movement for Mexican independence was launched here, and it was here that the Emperor Maximilian, after his trial, was shot on the Cerro de las Campanas. Q. is a well-built town with a cathedral, fine churches, and convents, notably that of Santa Clara, a Franciscan monastery, hospitals, and old palaces. These latter include the federal palace and gov. palace, both built of basalt, and the municipal palace with romantic associations with the war of independence. Q. has a cotton mill which was estab. in 1840, an important opal mine, flour mills, and tanneries. Alt. 6000 ft. Pop. 33,630.

Querfurt, Ger. tn in the dist. of Halle, on the Querne, 16 m. SW. of Halle (q.v.). Formerly the cap. of a small independent state, in 1835 it became part of Saxony, and in 1815 was transferred to Prussia (qq.v.). It has textile manufs. Pop.

Querido, Israel (1872-1932), Dutch novelist and critic, b. Amsterdam. He began his literary career principally in the field of criticism, where his judgments were once much esteemed in Holland. He likewise achieved a popular reputation as a writer of naturalistic fiction. Among his works are *Meditations over Literatuur en Leven*, 1898; *Menschenwee* (Toll of Men), 1903; *Literatuur en Kunst*, 1906; *Kater Don Juan*, 1930; *Essay en critick*, 1930.

Quern (O.E. *cweorn*), hand-mill, used before the invention of water- or wind-mills for grinding corn. A usual kind consisted of 2 circular stones, the upper being pierced by a hole in the centre and revolving on a wooden or metal pin inserted in the lower. The grain was dropped into the opening, and the upper stone revolved by a stick in a hole near the edge. Small ones are sometimes used for grinding pepper or mustard. The saddle-quern, a 2-handed mill, allowing a backward-and-forward motion of the upper stone, is found in Neolithic cultures and frequently in the Late Bronze Age and Early Iron Age. Rotary Q.s were used in the Early Iron Age, and much developed by Rom. agriculturalists; in the latter period they were often made from lava derived from Andernach on the Rhine.

Quesada, Sp. tn in the prov. of Jaén, in the Sierra de Cazorla. It has an agric. trade, and there are salt mines near by. Pop. 8000.

Quesal, Quetzal, or **Long-tailed Trogon** (*Pharmacops pterocarpus*), large bird, native of Central Amer. forests, and of extraordinary beauty of plumage. The male has a tail about 3 ft. in length, the outer feathers of which are white with black bases, contrasting brilliantly with the rich metallic or golden-green of the head, back, and tail coverts; the breast is bright scarlet. The head bears a large rounded crest, and over the wings hang a number of fine drooping plumes. The female is much smaller, and lacks the long tail and decorative plumes. The diet is chiefly fruit. The Q.'s feathers were used as ornaments by Guatemalan and Peruvian chiefs; and the bird itself now forms the badge of Guatemala.

Quesnay, François (1694-1774), Fr. economist and physician, b. Mérey, near Paris. He studied medicine and surgery in Paris, graduated M.D. in 1744, and was appointed physician to Louis XV and to Mme de Pompadour. He devoted himself to economic studies, and founded the sect of the 'Economistes,' which included among its members Mirabeau, Baudeau, L'arivière, etc. Q.'s theories are set forth in his articles on 'Fermiers' and 'Grains' in Diderot's *Encyclopédie*; but he is best remembered for his *Tableau économique*, 1758. See H. Higgs, *The Physiocrats*, 1897.

Quesnel, Pasquier (1634-1719), Fr. Jansenist theologian, b. Paris; joined the Fr. Oratory (1657). His ed. of the works of Leo the Great (1675) was condemned for Gallicanism, and placed on the Index (1676). Q. was banished from Paris for his Jansenist views (1681), and having refused to subscribe to a decree condemning Jansenism (1684), fled to Brussels, where Arnould (q.v.) befriended him. The Jesuits, always hostile, had him imprisoned (1703), but he escaped to Amsterdam, to found the still-existing Jansenist congregation. His *Nouveau Testament avec les réflexions morales*, 1693-94, was condemned by the bull *Unigenitus*, 1713. His *Lettres* were ed. by Le Courayer, 1721-3. See L. Seché, *Les Derniers Jansenistes*, 1891; Mme Albert le Roy, *Un Janséniste en exil*, 1900; A. Maulvault, *Répertoire de Port Royal*, 1902; J. Pasquier, *Le Jansénisme d'après les sources*, 1909.

Quesnoy-sur-Deûle, Fr. tn in the dept of Nord, 6 m. from Lille. It has textile manufs. Pop. 3700.

Quételet, Lambert Adolphe Jacques (1796-1874), Belgian astronomer and meteorologist, b. Ghent, became prof. of mathematics at Brussels Athenaeum (1819). He superintended the construction of the Royal Observatory there (1826), becoming its director (1828). Q. held the chair of astronomy and geodesy at the Brussels Military School (1836), and was secretary of the academy from 1834. He is best known as a statistician. His works include *Sur l'homme et le développement de ses facultés*, 1835, 1869; *Sur la théorie des probabilités*, 1846 (see Herschel in *Edinburgh Review*); *L'Anthropométrie, ou mesure des différentes facultés de l'homme*, 1871. See *Mémoires et Bulletins* of the Brussels Academy; E. Mailly, *Essai*, 1875; and M. Halbwachs, *La Théorie de l'homme moyen*, 1913.

Quetta, tn of W. Pakistan, lies at an elevation of over 5000 ft, 20 m. NW. of the Bolan Pass. It is the H.Q. of the Baluchistan Administration, the president being represented by an agent, and is the site of a Staff College. The railway sends one branch from Q. to Chaman on the Afghan frontier and another from Sibi through Q. to the Persian frontier at Bostan. On 31 May 1935 some 20,000 people were buried in the ruins of their homes by an earthquake, and 3000 others were killed by the havoc wrought by the earthquake in the surrounding dists. The city and the civil and railway areas were totally destroyed, while in the cantonment area the R.A.F. barracks collapsed and all remaining buildings were destroyed or rendered uninhabitable. Not all the buildings have been replaced. Q. is a great centre for fruit growing.

Quetta Bond, method in brickwork in which steel reinforcing bars are placed in cavities, filled with concrete, in the thickness of a wall.

Quetzal, see **QUETZAL**.

Quetzalecanil (from *quetzalli*, green feather, and *cohuatl*, snake), hero-god of

the anct Mexicans, especially worshipped at Cholula. He is sometimes represented as one of the 4 chief Mexican gods, controller of the air and winds, who assisted in the creation of man; but more frequently as a man with supernatural attributes who tried to abolish human sacrifice. In a Toltec legend Q. was a fair-skinned man who disappeared across the sea, promising to return at a future date. Cortez made use of this legend. Jesuit authors embellished the myth, and sometimes identified Q. with St Thomas. See W. H. Prescott, *The Conquest of Mexico*, 1878, and D. H. Lawrence, *The Plumed Serpent*, 1926.

Queuille, Henri (1834-), Fr. statesman, b. Corrèze. He studied medicine and became a Radical-Socialist deputy in 1914. From 1933 he was minister of agriculture in 8 different govts., twice minister of public works, twice minister of health, once minister of posts and telegraphs, and finally minister of finance in 1940. After the collapse of France in 1940 he crossed to England and joined de Gaulle's administration. Yet before he became Prime Minister in 1948 he was comparatively little known to the general public. His opportunity came with the acute domestic crisis of mid-1948, when the political situation demanded a Premier of middle-class liberal outlook, free from extreme ideological basis, and of lifelong experience in public administration. Q. exactly fulfilled these conditions, besides possessing an excellent working knowledge of the Fr. peasant and agriculture. Q. succeeded Schuman as Premier on 12 Sept. 1948, and remained in office until Oct. 1949, when he was succeeded by Bidault. His length of premiership was a Fr. post-war record, until 1957, when it was beaten by Mollet (q.v.). Q. has subsequently held numerous offices in various govts. and was Premier again July 1950 and Mar.-Aug. 1951.

Quevedo y Villegas, Francisco Gómez de (1580-1645), Sp. satirist, poet, and dramatist, b. Madrid, and brought up at court. He was educated at the univ. of Alcalá. In 1613 he received an invitation from the Duke of Ossuna, viceroy of Sicily, who made him his political agent. As Ossuna's fall in 1619 Q. was imprisoned. In 1623 he returned to Madrid and joined the court of Philip IV, where his political writings sev. times brought him into trouble. He wrote some excellent verse, but his power and originality is best seen in his prose. His political works include *Política de Dios*, 1626, an attack on the gov., and *La Vida de Marco Bruto*, 1632-44. His best work is a brilliant picaresque novel, *La Vida del Buscón*, several times trans. into Eng. It is run close by his *Los Sueños*, 1627, a vol. of fantastic philosophical essays, trans. into Eng. by Roger l'Estrange, 1667, 1904. He also wrote sev. devotional prose works, sev. interludes and comedies. The best collected ed. is in the *Biblioteca de Autores Españoles*. See lives and studies by J. Juderías, 1923.

and L. Astrana Marin, 1925. See also *Epistolario completo*, ed. L. Astrana Marin, 1946.

Quezaltenango: 1. Dept. of SW. Guatemala, Central America, bounded S. by the Pacific Ocean and Chorrera R., W. by Naranjo R. Of its volcanoes, Santa Maria (in eruption 1902-3) is the most noted. Coffee and sugar-cane plantations are in the SE. Hides, rubber, maize, and wheat are also exported. Pop. about 190,000.

2. Cap. of above (founded as Xenahu or Kelahu), about 72 m. NW. of Guatemala, at the foot of the Santa Maria volcano. An earthquake did much damage in 1902. Q. is the second city of the country. Cottons, linens, and woollens are manufactured; coffee is the chief export. The sulphur baths of Almolonga are much visited. Pop. 36,209.

Quezon, Manuel Luis (1878-1944), first president of the Philippine Is., b. in humble circumstances in Luzon. He graduated from the College of San Juan de Latran in 1893. In 1898 he joined the insurgents under Aguinaldo. Later he studied law at the Univ. of San Tomás and was called to the bar. He became prosecuting attorney for Mindoro and Tabayas. A member of the first native Filipino Assembly, he began his long political association with Sergio Osmeña, another young lawyer, whom Q. had appointed speaker in the assembly. Osmeña estab. himself as the champion of the native movement for independence, while Q. went to the U.S.A. as resident commissioner in Washington to plead for independence. Q. soon realised that the security of the Is. depended on strengthening their ties of friendship with the people of the U.S.A. His efforts resulted, in 1916, in the passing of the Jones Act, providing for a measure of autonomy and eventual independence. He then returned to Manila, becoming a senator there and continuing his efforts for independence. In 1934 he was instrumental in the passage of the McDuffie-Tydings Bill, increasing Filipino powers of self-gov. with a promise of freedom in 1946. In 1935 he was elected the first president of the commonwealth of the Philippine Is. by an overwhelming vote. He then invited Gen. MacArthur to become his military adviser and to organise the Philippine armed forces. His second term was inaugurated in an air-raid shelter in Dec. 1941, and it was not until a personal message from President Roosevelt reached him in 1942 that he left the Is. and, with his family and Cabinet members, joined MacArthur in Australia. A bill was passed in Congress to enable him to retain the office of president until the Is. were cleared of the Japanese, but he d. from tuberculosis in New York in 1944. Q. lacked administrative experience, but exercised his office with enthusiasm and dignity.

Quezon, prov. of Luzon Is., Philippines, called Tayabas prior to 1946. Coconuts and rice are grown, and there is fishing. The cap. is Lucena. Pop. 416,719.

Quezon City, city in Rizal prov., Luzon. It replaced Manila as cap. of the Philippines in July 1948. Pop. 107,977.

Qui Tam, in law, the name once given to a penal action (see PENAL STATUTES) in which part of the penalty was given to the Crown and the other part to the common informer. So called because the writ describes the plaintiff as one '*qui tam pro domino rege quam pro se ipso sequitur*' ('who sues as well for himself as for the king').

Quia Emptores (literally 'whereas purchasers,' from the opening words), statute passed in 1290 to stop the practice of subinfeudation. The Act directed that upon all sales of land the feoffee (grantee) should hold the same, not of his immediate feoffor (grantor), but of the chief lord of the fee (or fief), of whom such feoffor himself held it. By granting out the whole or part of his estates to an under-tenant, any feudal tenant could, prior to 1290, escape his feudal obligations to his own overlord. The effect of the Act was to stereotype the number of fee simple (see ESTATE FREE) estates or 'manors' in the country.

Quia Timet. A Q. T. action (lit. 'because he fears,' from the words in the form of the petition) in a court of equity (see EQUITY) has for its object the prevention of apprehended wrong. Instances of equitable remedies granted in such an action are the appointment of a receiver, the making an order to pay a particular fund into court, a garnishee order on money in a bank, and an injunction (see INJUNCTION).

Quiberon, peninsula, fishing tn, and seaside resort of the dept of Morbihan, Brittany, France, opposite Belle Île. The peninsula (an is. before the Middle Ages) is united to the mainland by an isthmus defended by Fort Penthièvre. In the Bay of Q., Hawke defeated the Fr. fleet under Conflans (1780). In 1795 the Republicans under Hoche crushed the Royalist insurgents under D'Hervilly and Puisaye, supported by the Chouans and the Eng. fleet, and suppressed their attempt to stir up La Vendée and Brittany against the Convention. A daily ferry runs to Le Palais (Belle-Île-en-Mer). There are sardine and lobster fisheries. Pop. 4100.

Quiché, highland dept of W. Guatemala, Central America. Prin. rivers are the Chixoy and Motagua. Area 3234 sq. m. Pop. 173,520. Its cap. of the same name (or Santa Cruz del Q.) is 90 m. W. of Guatemala city and stands 6500 ft above sea-level. The ruins of Utatlán, the Indian city which the Spaniards destroyed, are SE. Pop. 4190. Some 54 per cent of the pop. of Guatemala are pure Indians of 21 different groups descended from the Maya-Q. tribe.

Quichua, see QUÉCHUA.

Quickens, or Quick Grass, name sometimes given to Couch Grass. See AGROPYRON.

Quicklime, see CALCIUM.

Quicksand (quick, living, moving), bed or mass of loose, moving sand, saturated

with water to such an extent that it readily yields to pressure and cannot support the weight of people or animals. It is usually very fine, mixed with clay or calcium carbonate. Sometimes fine mud with a thin layer of sand is called Q. Small tracts occur fairly frequently at riv. mouths (especially in the rivs. of Iceland) or along the coast, differing little at a glance in appearance from the shore of which they form part. Old writers sometimes give the name to the drifting sands (of a desert or the seashore) carried by the wind over the neighbouring cultivated land.

Quicksilver, see MERCURY.

Quikswood, **Hugh Richard Heathcote Cecil**, first Baron (1869–1956), statesman, fifth son of the third marquess of Salisbury. He was educ. at Eton and Univ. College, Oxford. After acting as private secretary to his father, he became a prominent figure in the House of Commons as Conservative member for Greenwich, 1895–1906. He was a supporter of Arthur Balfour's Education Act, 1904, and later one of the leaders of the Unionist Free Traders in opposition to Joseph Chamberlain's policy of Tariff Reform. He was defeated in a 3-cornered election for Greenwich, 1906; and was without a seat in the Commons until, in 1910, he was returned unopposed for Oxford Univ., which he represented until 1937. He was made a peer in 1941. C. was provost of Eton 1936–44. An ardent High Churchman, he supported the Enabling Bill; and, when it became an Act, he was elected a member of the Church Assembly which it set up in 1920. In 1928 he was wholeheartedly in favour of the ill-fated Prayer-Book Measure. He was the author of a book, *Conservatism, 1510–1911*, 1912, and also wrote *Liberty and Authority*, 1910; *Nationalism and Catholicism*, 1919; and *Natural Instinct: Basis of Social Institutions*, 1923.

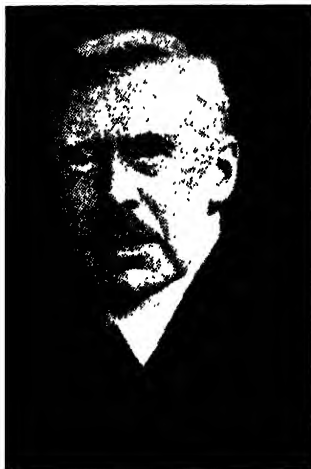
Quid Pro Quo, in law, the giving of one thing of equal value for another; or the mutual consideration and performance of both parties to a contract. See CONSIDERATION; CONTRACTS.

Quidde, **Ludwig** (1858–1941), Ger. historian and pacifist, b. Bremen, who, in 1892, led the Ger. peace movement, founding and editing the *Deutsche Zeitschrift für Geschichtswissenschaft*, 1889–95. An outspoken democrat, he was imprisoned for a short term in 1894 for attacks on the militarism of imperial Germany in a book entitled *Caligula*. He became a member of the Reichstag in 1919, and received the Nobel peace prize (with Ferdinand Buisson) in 1927. After 1933 he lived in exile in Switzerland.

Quietism, name given to a form of mysticism which has shown itself at different times in the Christian Church. The fundamental tenet of Q. is that the final state of union with God is reached when the soul is in a state of perfect inaction, and that in this union the soul is purely passive under the action of the Divine Light. The belief was held by many heretical sects of the early Church

in both E. and W., and its affinity with the Neoplatonic doctrine will at once be seen. The name, however, was first used in connection with the adherents of the Sp. priest Molinos, whose book, *The Spiritual Guide*, was condemned in 1687. Mme Guyon is one of the best known of the Quietists, and through her similar views were accepted by Fénelon till they were condemned by Innocent XII in 1699, when he repudiated them. The Quakers' doctrine of the inward light is very similar to that held by the Quietists. See J. Denis, 'Quietisme,' in *Mémoires de l'Académie de Caen*, 1894; H. Heppé, *Geschichte der Quietistischen Mystik in der Kathol. Kirche*, 1875; and A. Farges, *Mystical Phenomena*, 1926.

Quiller-Couch, **Sir Arthur Thomas** (1863–1944), author and prof. of Eng. literature, b. Bodmin, Cornwall, eldest son of Thomas Q.-C.; and grandson of Jonathan Couch, of Polperro, ichthyologist. He was educ. at Newton Abbot, College, Clifton College, and Trinity College, Oxford, and while at the univ. he pub., in 1887, *Dead Man's Rock*, which met with considerable success, and enabled him to enter upon a literary career.



SIR ARTHUR QUILLER-COUCH

This 'thriller' undoubtedly owed much to the influence of R. L. Stevenson, whose unfinished *St Ives* he completed about this time. He left Oxford in 1887, after having been a lecturer in classics at Trinity for a year. After 4 years in London in literary adventures he returned to the W. country. In 1889 he married a daughter of John Hicks, of Fowey, and Cornwall was his home for the rest of his life. *The Astonishing History of Troy Town*, 1888, introduced

his favourite in Fowey under the name of Troy. In London in 1889 he joined the staff of the Liberal weekly, the *Speaker*, thus gaining some journalistic experience. In the *Spectator* he wrote weekly about current literature, his articles being collected in a vol. entitled *Adventures in Criticism*. Like Dr Johnson, Q.-C. made no fundamental distinction between good literature and good journalism. However trivial the subject he always wrote with style. It is nevertheless true that his prominence as a critic dates from the pub. of his *Oxford Book of English Verse*, 1900, which was on all hands recognised as the true successor of Palgrave's *Golden Treasury*. In his early days he wrote under the pseudonym of 'Q.' He was knighted in 1910, and in 1912 he was appointed King Edward VII prof. of Eng. literature at the univ. of Cambridge, being elected a fellow of Jesus College. His inaugural address as prof. was delivered in Jan. 1913, and was followed by a series of lectures which now for many years have been well known and admired as books entitled *On the Art of Writing*, 1916, and *On the Art of Reading*, 1920. Amongst his works are *The Ship of Stars*, 1899; *The Adventures of Harry Revel*, 1903; *Hetty Wesley*, 1903; *Sir John Constantine*, 1906. He ed. *The Golden Pome* (Eng. lyrics), 1895, *The Oxford Book of English Verse*, 1900, *The Oxford Book of Ballads*, 1910, *The Oxford Book of Victorian Verse*, 1912, *The Oxford Book of Prose*, 1925, *The Poet as Citizen*, 1934, and *Q's Mystery Stories*, 1937. He was also general editor of the *Kings Treasures of Literature* (258 vols.), begun in 1920, and ed. with J. D. Wilson the comedies in the New Cambridge ed. of Shakespeare. His professorial lectures have been printed under the following titles: *Studies in Literature* (3 series), 1918, etc., *Shakespeare's Workmanship*, 1920, and *Charles Dickens*, 1925. His poems were collected in 1928. His unfinished autobiographical *Memories and Opinions* was pub. in 1944. See life by F. Brittain, 1947.

Quillota, tn in the prov. of Valparaíso, Chile, about 26 m. N.E. of Valparaíso, and cap. of Q. dept. Wine and orchard produce are the chief sources of income. Pop. c. 17,350.

Quilmes, industrial tn 9 m. S.E. of Buenos Aires, Argentina, on the Roca railway. Noted for its large brewery, its other products include textiles, rayon, and glass; it also has oil refineries. It has an Eng. college and a high school for girls. Pop. 105,000 (dist. 133,000).

Quilco, see KILWA KISIWANI.

Quilter, Roger (1877-1953), composer, b. Brighton and educ. at Eton. He studied music with Knorr at Frankfurt. He never held any official musical posts. His works include 3 light operas, incidental music for Shakespeare's *As You Like It* and the children's fairy-play *Where the Rainbow Ends*; *Children's Overture* on nursery tunes; serenade, *Three English Dances*, etc., for orchestra; song-cycle *To Julia* (Herrick); and c. 100 songs to words

by Shakespeare, Herrick, Blake, Tennyson and others. Q.'s songs are especially and deservedly well known. His artless melodic invention has a refined and distinctive harmonic support and outweighs limitations of manner.

Quilting, see EMBROIDERY.

Quimper, or **Quimper-Corentin**, cap. of the dept. of Finistère, France, situated about 36 m. S.E. of Brest on the R. Odet. Its cathedral, dating from the 13th cent., is a beautiful example of Gothic architecture. Fréron (q.v.) was a native of the tn. Manufs. pottery, jams, biscuits. Pop. 20,100.

Quimperlé, tn in the arron. of Quimper, Finistère, France. It grew up around the 11th-cent. abbey of St Croix, part of which still exists. Pop. 10,700.

Quin, James (1693-1766), actor, son of an Irish barrister, b. London, and educ. at Dublin. He made his first appearance on the stage in 1710 at Dublin, and in 1714 was seen at Drury Lane Theatre, London, in small parts, making his mark in Nicholas Rowe's *Tamerlane* the following year. In 1716 he went to the theatre in Lincoln's Inn Fields, where he remained for 14 years. The rest of his career was divided between Covent Garden and Drury Lane. He was acknowledged to be the finest actor in England till the appearance of Garrick in 1741. Falstaff in *King Henry IV* was the character in which he excelled. See anonymous life, 1887.

Quin, Windham Thomas Wyndham-, see DUNRAVEN and MOUNT EARL, EARL OF.

Quince, or *Cydonia oblonga*, family Rosaceae; native of Central Asia, a small tree grown for its ornamental beauty, and fruit, which is chiefly valued for the making of jellies and preserves. 'Bereczki' and 'Champion' are good varieties, the fruit being well ripened on the tree before picking. Q. is also valued as a dwarfing stock for pears; the Common Q. and Angers Q. being chiefly used. The so-called Jap. Q. is *Chaenomeles speciosa* (q.v.).

Quincey, Thomas de, see DE QUINCEY.

Quincunx, arrangement of 5 objects set so that 4 are at the corners of a square or rectangle and the other at the centre (e.g. the 5 on dice or cards); it is frequently adopted in plantations. In medieval astrology the word was used to describe an arrangement of planets when at a distance from each other of 5 signs, or 150°.

In botany Q. denotes a particular arrangement of the leaves which is found in certain trees such as the apple, pear, and cherry. The sixth leaf on a stem is vertically above the first, after 2 turns of the spiral. See also ROMAN ARMY.

Quincy, Josiah (1772-1864), Amer. statesman and patriot, b. Braintree (now Quincy), Massachusetts, graduated at Harvard, and called to the Bar in 1793. He became a leader of the Federalist party in Massachusetts in 1800, and remained in Congress till 1812. He possessed fine oratorical powers, and a statesmanlike

grasp of affairs. In 1822 he was appointed judge of the municipal court of Boston, and in 1829 president of Harvard Univ., a position he retained till 1845. His last years were spent in retirement, chiefly on his farm in Quincy. Amongst his pubs. are *History of Harvard University* (2 vols.), 1840; *The Municipal History of Boston*, 1859; and *Memoir of the Life of John Quincy Adams*, 1858. See life by E. Quincy, 1867.

Quincy: 1. City, co. seat of Adams co., Illinois, U.S.A., on the Mississippi R. (bridged), 95 m. W. of Springfield. It is an industrial, trade, and distributing centre for a wide area. Q. manufs. machinery, flour, radio equipment, etc. It is the seat of Q. College. One of the Lincoln-Douglas debates was held here. Pop. 41,450.

2. City of Norfolk co., Massachusetts, U.S.A., on Q. Bay, 8 m. from Boston, noted for fine granite quarries. There are shipbuilding yards and foundries, and manufs. of oils, chemicals, boots and shoes, ironware, etc. It has historical interest and was the bp. of John Hancock, John Adams, and John Quincy Adams. The first (horse-drawn) railroad in the U.S.A. was built here to haul granite. Pop. 83,835.

Quinine, alkaloid found in the bark of various species of cinchona, from which it is obtained by mixing the bark with milk of lime, treating with boiling alcohol, and extracting the alkaloid in the form of the sulphate by adding dilute sulphuric acid. The sulphate, which is the form most generally met with, is soluble in 780 parts of cold water, but is more readily soluble in hot water and in alcohol. It is used in medicine as a tonic, an antipyretic, and a specific in malaria (q.v.). It acts as a stimulant to the nervous system, lessens the amoeboid movement of the white corpuscles, and lowers the temp. If it is higher than normal. Taken in excess, it produces ringing in the ears, disturbance of the vision, headache, and irritation of the digestive tract. Its chemical formula is $C_{20}H_{24}O_6N_2 \cdot 3H_2O$, and its molecular structure has been elucidated by Koenigs and other chemists. It has been synthesised by Woodward and Doering from hydroxyisoquinoline. See also CINCHONA BARK ALKALOIDS.

Quinoa (*Chenopodium quinoa*), herb, allied to the common Brit. goosefoot, cultivated in Chile and Peru for its seeds, which are boiled like rice for eating, or are roasted to produce a coffee-like decoction known as carapulcra.

Quinol, or **Hydroquinone**, colourless crystalline solid (m.p. 169°C .), known in chem. as *para*-dihydroxybenzene. It is prepared by reducing quinone (q.v.) with sulphurous acid (q.v.), and owing to its strong reducing powers it is used as a photographic developer.

Quinoline (C_8H_7N), aromatic base occurring with its isomer, *isoquinoline*, in the fraction of coal-tar collected between 236° and 243°C .; it is usually prepared by the 'Skraup' reaction, viz. heating a mixture of aniline and glycerol with con-

centrated sulphuric acid and nitrobenzene. Q. is a colourless liquid, boiling at 239°C . It has a pleasant smell, is sparingly soluble in water, but dissolves readily in alcohol, ether, and chloroform. Q. itself is used as an insecticide, and certain of its derivatives are valuable medicinally. See also LEUCOL.

Quinone, class of organic compounds known as the Q.s. The simplest member of this class, benzoquinone ($C_6H_4O_2$), is obtained by oxidising aniline with potassium dichromate and sulphuric acid. It is a yellow crystalline solid, melting at 116° , has an irritating smell, is volatile in steam, dissolves sparingly in water but readily in alcohol and ether. Many other Q.s can be obtained by the oxidation of certain hydroxy- and amino-compounds with chromic acid. They possess the same general physical properties. Anthraquinone, $C_{14}H_8O_2$, is important as the source of many valuable dyestuffs, while benzoquinone (often known simply as 'Q.') yields the photographic developer quinol (q.v.), when reduced with sulphurous acid.

Quinquagesima (Lat. 'fiftieth'), Lat. name for the Sunday before Ash Wednesday. Counting roughly, this Sunday is 50 days, or at any rate in the 5th decade, before Easter.

Quinque Ecclesiae, see P&Cs.

Quinquereme, ant type of warship propelled by 5 banks of oars on either side. It is said to have been introduced by Dionysius of Syracuse about 400 bc.

Quinsay, see TONGSAI.

Quintain (from Lat. *via quintana*, the place for exercise in a Rom. camp), name given to an object, mounted on a support, to be tilted at, a pastime in vogue in the Middle Ages. It was generally a swinging bag, although the post itself had sometimes to be struck so as to smash the lance.

Quintal, see METROLOGY.

Quintana Roo, federal ter. of Mexico, in the Yucatán peninsula, lying between the Caribbean Sea on the E. and Brit. Honduras on the S., yielding tropical forest products and henequén. Constituted in 1902, it has an area of 19,630 sq. m. Chetumal is the cap. and main port. Pop. 27,000.

Quintanar de la Orden, Sp. tn in the prov. of Toledo. It manufs. wine, textiles, and cheese. Pop. 9400.

Quintero, Serafin Alvarez (1871-1938), and Joaquín Alvarez (1873-1944), Sp. dramatists, brothers, b. Utrera, Seville. Most of their pieces are comedies and have a background of Andalusian life. The best-known are *Los Galeotes*, 1900; *Las Flores*, 1901; *Malvaloca*, 1912; and *La Calamitada*, 1919. They are not remarkable for deep moral or social purposes, but they are gay and humorous, and the dialogue is always irresistible. See Helen and Harley Granville-Barker, *Four Plays by Joaquín and Serafin Quintero*, 1928.

Quintet, musical composition, written for 5 parts, vocal or instrumental, in which each part is essential to the rendering

of the whole work, more particularly a chamber work in sonata form for 5 instruments, usually pianoforte and string quartet (pianoforte Q.) or 5 stringed instruments (string Q.). Of vocal Q.s the most famous is that which occurs in Wagner's *Meistersinger*. Q.s for stringed instruments have been composed by Mozart, Beethoven, Mendelssohn, Schubert, and others, and Q.s for other instruments by Brahms, Schumann, and Schubert, &c.

Quintilian (Marcus Fabius Quintilianus) (c. AD 40–c. 100), Rom. critic and rhetorician, b. Calagurris, Spain; educated in Rome, which he left early in Nero's reign. Returning with Galba in 68, he quickly achieved fame and wealth as a teacher, and in 88, or soon afterwards, was entrusted with the education of Domitian's grand-nephews. His prin. and sole surviving work, which enjoys undying fame, is the *Institutio Oratoria*, an exhaustive treatise on the education of an orator. His style is good, his taste impeccable, while his moral tone is in striking contrast with the general degradation of his age. The best ed. is that of L. Radermacher (1907–35); there is also a text and trans. by H. E. Butler (Loeb Library, 1921). See J. Cousin, *Études sur Quintilien*, 1936.

Quintinus, or **Quentin**, St. (d. 287), traditionally supposed to have been a Roman by birth. A missionary to Gaul, he converted the inhab. of the Amiens dist., being martyred at the tn now called St Quentin.

Quintuple Treaty (1839), celebrated 'scrap of paper,' the breach of which was the immediate cause of the entry of Great Britain into the First World War. It was by this treaty that the neutrality of Belgium was guaranteed by the great powers after Belgium had revolted from the union with the Netherlands in 1830. The Q. T. imposed a moral obligation on each signatory to respect its provisions irrespective of whether these were violated by any other signatory. Strictly there were 2 treaties: the first, wherein the King of the Netherlands agreed with the 5 powers (Austria, France, Great Britain, Prussia, and Russia) to recognise the existence of Belgium as 'an independent and perpetually neutral state, bound to observe neutrality toward all other states'; the second (not signed by the Netherlands), whereby the 5 powers guaranteed the provisions of the first treaty. An important feature of this treaty is that it omitted provisions in previous agreements (which were of a temporary nature) for the occupation of Belgian fortresses by Great Britain and Prussia. Thus no signatory contemplating a breach could start with this definitive advantage over the other signatories. In 1866–7 a draft second treaty was concluded between France and Prussia by which Napoleon III proposed that he should annex Belgium in consideration of facilitating the union of Germany with and under Prussia in the 'North Ger. Confederation.' Bismarck betrayed this conspiracy and gained his object without

paying the price. When the Franco-Prussian war of 1870 broke out the Brit. Gov. asked the belligerents to state their intentions with regard to Belgium. Neither wished to invite Great Britain's intervention, and hence each disavowed any intention of crossing the Belgian frontier, and duplicate treaties were signed to that effect, the Brit. Gov. undertaking at once to declare war on the party infringing this proviso. These treaties were to be operative during the war and 12 months after, the independence and neutrality of Belgium depending, on the expiration of that period, as heretofore on the treaty of 1839. To whatever degree this treaty was made in the interests of the guarantors, it was clearly as much to Belgium's advantage. Its violation by Germany was not seriously defended by the Ger. Gov. See BELGIUM; NEUTRALITY.

Quintus Calaber (Calabar or Smyrnaeus), GK poet, fl. 3rd–4th cent. AD, so called because his epic, *Paralipomena Homeri* or *Posthomerica* (continuing the Trojan war from Hector's death to the return of the Greeks), was discovered at Otranto in Calabria in the 15th cent. His materials were mainly derived from the cyclic poets, especially Lesches and Arctinus. The first ed. of Q. was printed with Tyrphiodorus and Coluthus (probably his contemporaries) by Aldus (c. 1505). The *Posthomerica* was ed. by A. Zimmerman in 1891 (trans. A. S. Way, 1913). See G. W. Paschal, *A Study of Quintus of Smyrna*, 1904; M. W. Mansur, *The Treatment of Homeric Characters by Quintus of Smyrna*, 1940.

Quintus Curtius Rufus, see CURTIUS.

Quintus of Smyrna, see QUINTUS CALABER.

Quipu (from Peruvian 'knot'), also *quippu*, *quipo*, *quippos*, *kipu*, plural *quipus*, *kipas*, was a knot device of communication employed in anct Peru. It generally consisted of a number of threads or cords of different length, thickness, and colour, mainly of twisted wool, hanging from a top-band or cross-bar. It was used for reckoning accounts, but also for recording historical events and edicts, and for sending messages. The number, size, position, distance apart, and colour of the knots all had particular meanings. Some other anct peoples (in China and Tibet) and some primitive tribes of the present day have also employed similar mnemonic devices of communication. See also WRITING.

Quire, see METROLOGY; PAPER.

Quirinal, one of the 7 hills on which Rome was built, N. of the Palatine, and one of the oldest quarters of the city. On it stands the former palace of the kings of Italy, known by the same name.

Quirinius, see CYRENIUS.

Quirinus, see ROMULUS; MARS.

Quirites, name which the citizens of Rome assumed in their civic capacity. It is connected with Quirinus, an anct Rom. deity associated with Mars.

Quisling, Lauritz Vidkun Abraham (1887–1945), Norwegian politician, b.

Fyresdal, graduated in 1911 from the Norwegian royal military academy. From 1924 to 1926 he worked for Nansen and for the League of Nations, residing mainly in Moscow. He entered politics on his return to Norway in 1929, proving a rabid anti-Communist, though few Norwegians ever regarded him seriously. He became defence minister in 1931, later founding a Fascist party, the Nasjonal Samling. His actions during the Second World War made his name a synonym for a traitor. He proclaimed himself Prime Minister after the Ger. invasion in 1940, but his political following was virtually non-existent and the Germans dismissed him. But later the same year Q.'s party was the only one not abolished, and in 1942 Q. was appointed 'minister-president' of a puppet, Ger.-controlled gov. After the war Q. was found guilty of treason and executed. See NORWAY, *History*.

Quisqualis, genus of climbing shrubs (family Combretaceae), with terminal clusters of white or orange-red flowers, natives of India and the Malay Archipelago. *Q. indica* is grown in stove-houses.

Quit Rents, rents formerly paid by a copyholder (see COPYHOLD) to his lord which 'quit' him of a duty to perform agric. services. The Law of Property Act, 1922, converted copyholds into freeholds, and all Q. R. were extinguished by 1935. Compensation for loss of Q. R. could be claimed until 1950.

Quito, cap. of the prov. of Pichincha, and of Ecuador, situated about 160 m. NNE. of Guayaquil. Nearly 10,000 ft above sea-level, it has a temperate climate though close to the equator. The air is frequently chilly owing to the altitude; the average monthly temp. is 54° F., with a range of less than 1°. Q. is well laid out and has sev. large squares, among them the Plaza Mayor. The centre of the tn is the Plaza Independencia, a plaza of gardens, fountains, and tropical trees. The city is old and was originally the cap. of the Incas, estab. on the site of an old Indian vil. on the slopes of the volcano Pichincha. The volcano is no longer active, and on its lower, gentler slopes are small farms devoted chiefly to grains and potatoes. The whole area, however, is subject to earthquakes. Q. has a univ. and a fine cathedral, the see of an archbishop. The Museo de Arte Colonial is especially rich in paintings and other aspects of plastic art of the viceregal period. The manufs. include shoes, woollen and cotton materials, saddles, blankets, carpets, and food products. It is an important traffic centre. During the colonial period Q. was administered first from Lima and later from Bogotá. When the wars of independence freed the colonies from Spain, Q. was included with Colombia and Venezuela in a 'Greater Colombia,' which Bolívar (q.v.) in vain attempted to form and administer from Bogotá. Pop. 213,000.

Quixote, Don, see CERVANTES.

Qum, see QOM.

'Quo Vadis?', see SIENKIEWICZ, HENRYK. **Quo Warranto**, old writ formerly issuing from the king's bench div. against anyone who claimed or usurped any office, franchise (q.v.), or liberty, to inquire by what authority he supported his claim, in order to determine the right. It lay also in case of non-user or long neglect of a franchise, or abuse of it, and commanded the defendant to show by what warrant he exercised such franchise, having never had any grant of it or having forfeited it by neglect or abuse. The judgment on a writ of Q. W. was final and conclusive, even as against the Crown. It has long ago fallen into disuse, having been superseded by an *information* (a mode of criminal prosecution) filed by the attorney-general. The term Q. W. is especially applied to a unit of inquiry set up in 1278 by Edward I, who desired to examine the warrants by which barons and corporations owned land and exercised jurisdiction, in an attempt to prevent encroachments on the privileges of the Crown.

Quoin (Fr. *coin*, corner): 1. External angle of a building. In Renaissance architecture, Q.s are often emphasised by rustication (q.v.). See also MASONRY.

2. Short blunt wedges used by compositors to secure the type in the chase. Mechanical Q.s worked by a central screw operating an expanding device are sometimes used. The term is applied in many trades, etc., to pieces of wood, stone, etc., used for wedging.

Quoits, game having some resemblance to the ancient practice of discus-throwing, though it is more skillful and does not require so much strength. The game is played as follows: 2 iron or steel pins or 'hobs' are placed in the ground at a distance of 18 yds apart, and round each of them a circle of 3 ft diameter is drawn. Play may be from either end, as in bowls. The object of the game, which may be played by any number of players divided into sides, is to throw the Q. as near the pin as possible. A ringer (or quoit surrounding the pin) counts 2 points, and the quoit nearest to the hob 1 point. In some versions of the game a quoit which cuts or stands on edge against the hob counts 2 points and a ringer 3. The quoit is, as a rule, about 7-9 lb. in weight, not more than 8½ in. in diameter, and with a hole of about 2½ in. diameter for the thumb or forefinger. Q. dates from the 15th cent., and is played now in Britain, principally in Scotland, Lancs. and the Midlands. It is also played in America.

Quorn, one of the most famous hunts and hunting packs in England, named from Quorndon (q.v.), though its actual centre is at Melton Mowbray.

Quorndon, par. and tn of Leicestershire, England, 2 m. from Loughborough. Pop. about 3100.

Quorra, see NIGER.

Quorum. In law a justice of the peace is said to be of the Q. when the commission appointing him expresses that he is

one of those whose presence is necessary to constitute a bench, as at quarter sessions. The term Q. in this context is derived from the words in the Lat. form of the commission: 'Quorum unum A. B. esse volumus' ('Of whom we will that A. B. be one'). Hence by analogy, in any assembly, committee, etc., when it is necessary that a certain number of officers or members should be present to give validity to its acts, that number is said to constitute a Q.

Quota, the quantities of permitted imports, or the number of permitted immigrants, or the quantity of output agreed by arrangement between firms. After the First World War, immigration Q.s based on preferences for certain races—such as the Nordic in America—were estab. in the U.S.A. and other countries (see IMMIGRATION). The Brit. Colonial Office in 1934 introduced a Q. scheme for imports of secondary goods into the Crown colonies in order to restrict the excessive importation of 'sweated' goods from Japan. Great Britain also has a film Q. establishing the proportion of Brit. films which must be shown. The Brit. Gov. also applied the Q. system to the importation of wheat and other food-stuffs after the First World War. In Great Britain the term also refers to the proportion of home-grown wheat to be used by millers under the provisions of the Wheat Act in making flour. See PROTECTION.

Quotidian Fever, see MALARIA.

Qurna, El, or Kurna, tn of Iraq, 45 m. NW. of Basra, on the Tigris. The reputed site of the Garden of Eden is in the dist. The tn has strategic importance, and stands on an ant. site.

Qutaiha ibn Muslim (d. 716), Arab general, appointed governor of Khorasan by Hajjaj in 704. He extended Arab power over Transoxania, subduing the

oasis of Bukhara (706-9), then crossed the Oxus and took Shuman, Kish and Nasaf. He invaded Sistan (710-11) and Khwarazm (711-12); he then marched on Samargand; from here he penetrated the Zarafshan valley, Shaah, and Farghana, and is reputed to have reached Kashghar and to have come in contact with the Chinese. On the accession of Sulaiman to the Caliphate in 715 Q. rebelled and was killed in factional strife among the Arabs in Farghana in 715 or 716.

Qutb-ud-din Aibak (d. 1210), founder of Muslim dominion in India. He fl. in the late 12th and early 13th cents. during Mohammad Ghori's invasion of India. Q., in his youth, had been brought as a slave from Turkestan, but after being sold to the local governor of Nishapur passed into the hands of Mohammad. He was a fine rider and a good archer, was well enough educ., and rose to the highest rank in the service of Mohammad, who appointed him viceroy of his N. conquests. After the death of Mohammad Ghori Q. became independent and ruled N. India until his death in 1210 from an accident at polo. The royal line he estab. on an insecure throne is known in Indian hist. as that of the 'slave kings' from the origin of Q. His death was followed by revolt among both the Muslims and Hindus, and in 1211 the Muslim nobles offered the throne to Shams-ud-din Iltutmish, son-in-law of Q. and a member of a prominent Turkman family. Q. and Iltutmish between them erected on an enclosed space at Delhi the magnificent buildings known as the Jami mosque (Jami Masjid), the first to be built in India, and the Qutb-ud-din or Quwwat-ul-Islam mosque. See Sir H. Sharp, *Delhi: its Story and Buildings*, 1928; J. A. Page, *A Guide to the Qutb* (Delhi), 1938; and Sir G. Dunbar, *A History of India* (new ed.), 1948.

R

R, eighteenth letter of the Eng. alphabet, was the nineteenth in the numerical, seventeenth in the ordinary, Gk alphabet, seventeenth in the Rom., and twentieth in the N. Semitic. The earliest form of *r* was the N. Semitic 𐤓; in Greek the symbol became *ρ*, a short tail being at one time added, from which the Lat. and Eng. *R* is derived. Other forms of *R* were introduced at different times. The Semitic name of the letter is *resh*, meaning 'head', but it is doubtful whether this letter ever had the form of a head. The value of the character is always the same, a continuous sonant utterance made between the tip of the tongue and the roof of the mouth at a point more or less removed from the upper front teeth. The sound of *r*, however, varies more than that of any other consonant according to language or dialect. A syllabic *r* is found in many languages, and was probably present in the Indo-European mother-tongue. The Semitic *r* was probably trilled, whilst the *r* of modern India is a cacuminal *r*. In Chinese the sound *r* does not appear. In Great Britain Scotsmen and Welshmen trill their *r*'s more than Englishmen; Ger. and Fr. *r*'s are on the whole uvular. See ALPHABET.

Ra, Egyptian sun-god, worshipped at Heliopolis as the solar disk itself, in a peculiar temple open to the sun, in centre of which was a squat obelisk, symbol of the deity. *Ra* was believed to travel across the sky daily in a boat, returning nightly through the underworld to the east in another boat. By the 4th dynasty the king, who had been identified with Horus (q.v.), was declared to be 'son of *Ra*,' which became one of the royal titles, *Ra* becoming the supreme deity. The winged disk represented the fusion of *Ra*, Horus, and the king. In Heliopolitan theology *Ra* was assimilated with Atum, and in the New Kingdom with Amen (q.v.), being eventually replaced completely by Osiris.

Raab, see GYÖR.

Raabe, Wilhelm (1831-1910), Ger. novelist, b. Eschershausen, Brunswick. He was a student at Berlin Univ. where he took up philosophy, and while there pub. his first work, entitled *Die Chronik der Sperlingsgasse*, 1857, which was well received. *Ra* now went through a phase of pessimism, which is revealed in his novels *Abu Telfan*, 1868, and *Der Schüdderdump*, 1870. His later works, among which were humorous novels and historical tales, written at Brunswick, include *Horacker*, 1875, considered by most people to be his masterpiece, and *Hastenbeck*, 1899. His collected works (18 vols.) were ed. by H. Klemm (3rd ed., 1935). See life by W. Herz, 1926; and F. Hartmann, *Wilhelm Raabe, Gedanken und Erinnerungen*, 1927.

Raasay, is. of Inverness-shire, Scotland, close to the is. of Skye. Length 12 m.; breadth 1-3 m.

Rab (anc. *Arba*), Yugoslavian is. in the Adriatic, off the N. coast of Dalmatia. The cap., also called *R.*, has a Venetian palace, a 15th-cent. cathedral, and sev. anc. churches. The is. was known to the Romans, and was the bp. of Marcus Antonius de Dominis (q.v.). It has a growing tourist industry, and produces wine, fruit, and silk. Area 60 sq. m. Pop. 7750.

Rabanus (Hrabanus, or Rhabanus) Magnentius 'Maurus' (c. 776-856), Ger. Benedictine savant and prelate, of Fr. parentage, b. Mainz. He studied at Tours under Alcuin, returning to Fulda in Hesse (804), and founding there the first public convent school in Germany. He was made abbot (822-42), and became Archbishop of Mentz (Mainz) in 847. He condemned Gottschalk (848) for his views on the doctrine of predestination. *R.* wrote commentaries on the Bible, martyrologies, homilies, and poetry, including the *Veni Creator Spiritus*, and was a prominent scholar of his era. See his 'Opera omnia' in J. P. Migne's *Patrologiae Latinae Cursus Completus* (vols. cxi-cxli). See also the studies by T. Spengler, 1856; A. Köhler, 1870; and E. Dümmler, 1898.

Rabat: 1. (*R'bat el F'lah*, camp of victory) Cap. and seaport of Morocco (W. coast), N. Africa, in Gharb prov., opposite Sali (Sallee, Sla), serving as the port of Fez, 110 m. W. Textiles, carpets, and pottery are manufactured; other exports include skins, wax, cork, slippers, and beans. A bar at the mouth of the Bu-Regreg makes the entrance to the port dangerous. It was founded in 1190, and contains barracks, an arsenal, and an aqueduct. The most important feature is the half-finished tower, 143 ft high. The ruins of the anc. Shella or Sala Colonia are close by, with tombs of the Almohade and Marinide sultans. *R.* is an educational centre, and has an Institut de Hautes Études Marocaines, a school formerly maintained by the It. Gov., and the Institut Scientifique Chérifien, for research work. In 1928 teachers' training courses were started at the high schools for boys and girls. *R.* is on the route of the air service between Toulouse and Casablanca. There are modern port installations. During the allied landings in N. Africa in the Second World War, Amer. forces occupied *R.* on 11 Nov. 1943, and the tn became a base for the allied advance. Pop. 156,209 in 1951-2; 40,747 of these were Europeans, many of whom have since left Morocco.

2. Tn of W. Malta, stretching along the spur from the fortified walls of Mdina (q.v.). It covers much of the site of the city and has various relics of the

Rom. period, including a villa, which, partly restored, is now a museum. There are catacombs in which the dead of all periods have been buried, and there are troglodyte dwellings and cave churches. Among the notable buildings of the town are the fine 15th-cent. church of St Bartholomew, the 16th-cent. church of St Agatha, and sev. Renaissance and baroque monasteries. In the Binglemma Hills, to the W., is Verdala Palace (1586), the summer residence of the governor of Malta. R. is in a rich agric. region, producing pigs, goats, wheat, and vines. Pop. 13,000.

Rabaud, Henri (1873-1949), Fr. composer, b. Paris. He learned composition under Massenet at the Paris Conservatoire, and in 1894 won the Grand Prix de Rome. He is best known by his operas, particularly *Mdrouf*, first performed in 1914 at the Opéra-Comique, and *L'Appel de la mer*, based on J. M. Synge's *Liders to the Sea*, also first performed at the Opéra-Comique (1924). He composed 2 other operas, *La Fille de Roland*, 1904, and *Rolande et le mauvais garçon*, 1934. *Eclogue*, which was suggested by Virgil's *First Eclogue*, *La Procession nocturne*, and *Divertissement*, on Russian themes, are among his instrumental works. He also wrote 2 symphonies, film music, songs, etc. He was director of the Conservatoire from 1920 to 1941, succeeding Gabriel Fauré in the post, and was also conductor at the Opéra.

Rabaul, chief port of the Australian mandated ter. of New Guinea, Pacific Ocean, in N.E. New Britain, with a fine land-locked harbour. The harbour may once have been a great volcanic crater, which became broken at one side, and consequently is connected with Blanche Bay. It is deep and offers excellent protection for ships of any size. About the harbour lies a semicircle of mts, of which The Mother and The Daughters are a part, and in fact the tn of R. lies at the foot of The Mother. R. was estab. in 1910 by the Germans.

In June 1937 most of R. was threatened with destruction by an eruption of the volcanoes Mother and N. and S. Daughters. These eruptions covered the tn with mud and forced the surviving inhab. to flee, and the authorities then sought some better location for the archipelago's H.Q., the administration moving to Salamaua in 1938. In 1947 the Australian minister for external ter. announced that Kokopo was to be the administrative cap. See also PACIFIC CAMPAIGNS IN SECOND WORLD WAR.

Rabbi (Heb. 'my master'), title given to recognised teachers of the law among the Jews. After the destruction of the Temple, and the rise of the Rabbinic schools, it finally became extended to all those authorised to decide legal and ritualistic problems.

Rabbi ben Ezra, see IBN EZRA.

Rabbit (*Lepus cuniculus*), herbivorous rodent, which, by its extreme fecundity, its great adaptability, and the decrease in its natural enemies, has spread rapidly and

widely in temperate zones of the world. In Australia control has been, and is, costly, although cold-storage developments have made possible a large export trade in R.s for the table. The wild R. resembles the hare, but is smaller, with shorter head, ears, hind legs, and feet, is greyer in colour, and lacks black tips to the ears. R.s are gregarious and promiscuous, burrowing extensively in the soil. They start to breed at about 6 months. Gestation lasts 28 days. There are 4-8 litters in the year with 3-9 young per litter, born almost naked, blind, with closed ears, and completely helpless. In Great Britain young are born the year round, the largest litters in summer and the smallest in winter. There is apparently a pop. cycle also, increase, abundance, and decline taking 5-7 years. In agriculture the R. ranks second only to the rat as a pest. Destruction is a legal obligation. The most effective methods are: (1) trapping, snaring, and ferreting in autumn and early winter, followed by a blocking of holes; and (2) gassing, by placing calcium or potassium cyanide powder in all re-opened holes. The spread of the virus disease myxomatosis (g.v.) to England (it was first detected in Kent in Oct. 1953) has caused severe reduction of the pop. Under domestication R.s may be kept as pets or bred for exhibition, fur, or for meat. Domestic R.s are larger than wild R.s, more variable in colour and in features, such as pendent or lop ears, and length of coat.

Rabbit-keeping. R.s are kept commercially for meat production, fur, and pelts. For meat large cross-breeds such as Flemish Giant and Belgian Hare may be kept, but it is more profitable to rear dual-purpose breeds for meat and fur. The best breed for meat is the Chinchilla, which also gives a valuable skin or pelt. The best fur breeds for pelts are Rex varieties such as Chinchillarex, Lynxrex, Sealrex, Sablerex, Havanarex, and Lilacrex. The pelts are more valuable than the meat carcasses. The long-coated Angora is excellent for wool, for which there is an unsatisfied demand. The yield averages 12-14 oz. yearly per rabbit, the useful life being 3 years. R.s need constant attention, twice daily feeding, and once weekly cleaning-out. Feeding is economical, as the food consists largely of waste leafy greens and roots (brassica leaves, carrots, turnips, pea haulms, red clover, chickory, etc.) and needs only the supplement of hay, straw, or cooked potato-and-bran mash in times of shortage. Food should be fresh, fed frequently and in small amounts, if R.s are to thrive well. The size of the unit should be regulated by amount of food economically available in winter, but should include not less than 6 breeding does to be worth while, yielding about 90 R.s annually. Housing consists of breeding hutches with compartments 17 in. wide, 22 in. deep, and 42 in. long; colony hutches such as small sheds, allowing 2 sq. ft. of floor space per R.; and finishing hutches with compartments

18 in. wide, 17 in. deep, and 22 in. high. Hutches should face S. or SW., but be shaded from hot sun and sheltered from draughts. Breeding begins by mating up early in the year, late Jan. or early Feb., and 3 litters are usual, spaced throughout the year. Young R.s are weaned at 4-8 weeks, segregated as to sex, and placed in colony hutches. At about 4½ months bucks need to be placed in single hutches for finishing and to prevent damage to fur by fighting; the does need moving at about 5-6 months for finishing. Although valuable for their meat, the greater return comes from their pelts, and the R. should be pelted when in its best coat.

See J. Simpson, *The Wild Rabbit*, 1908; R. Byng, *Angora Rabbit-breeding*, 1926; Ministry of Agriculture, *Modern Rabbit Keeping*, 1941; G. A. Townsend, *Practical Rabbit Keeping*, 1941; C. J. Davies, *Rabbit Keeping*, 1942; F. W. Jones, *The Rabbit*, 1944; and L. R. Brightwell, *Rabbit Rearing*, 1944; H. V. Thompson and A. N. Worden, *The Rabbit*, 1956.

Rabbit Berry, see SHEPHERDIA.

Rabelais, François (c. 1490-c. 1553), Fr. satirist and humorist, b. Chinon, in Touraine. He was trained for the religious life by the Franciscans, having

for the secular priesthood. In 1531 he studied medicine at Montpellier, and later at Lyons, where he ed. works of Hippocrates and Galen. In 1532 he re-edited a popular medieval romance chronicling the deeds of the great giant Gargantua (see below). In 1534 and 1535 he was at Rome in the suite of Cardinal Jean du Bellay, ambas. to the papal court. He obtained a papal licence to return to the Benedictines, and became a canon of St Maur. He apparently studied medicine in various univs., and during the suppression of heterodoxy by the Sorbonne in 1546 he lived in Metz. In 1550 he returned, and obtained the curacy of Meudon, near Paris.

R. ed. or re-edited in 1532 a book entitled *Les Grandes et Inestimables Chroniques du grand et enorme giant Gargantua*; this must be distinguished from the latter *Gargantua*, which formed the first part of his great work, although it was probably written later than the second part (*Pantagruel*, the adventures of Gargantua's son). *Pantagruel* appeared in 1533, written by 'Alcophribas gantua' was pub. in 1535. In 1542 *Gargantua*, an anagram of F. R. *Gargantua* and *Pantagruel* were pub. together in a revised ed., and in 1546 a third part came out. A fourth part appeared in 1552, and in 1562, 9 years after R.'s death, came a fifth, of which the authenticity has been questioned, though it is now regarded generally as in essence by R., though possibly ed. and revised by another hand. *Gargantua* is the giant son of a giant father, Grandgousier. The first part tells of his education, which is a satire on the earlier teaching and an epitome of the new humanistic education; the abbey of Thelema is estab. on a model the exact reverse of the degraded monasticism of which R. was a devoted opponent. In the second book we are introduced to Pantagruel, Gargantua's son, his education and his meeting with Panurge, the beloved vagabond, a truly Falstaffian character, composed of wit, humour, rascality, and common sense. The other parts deal with the voyages in search of the lost 'Pantagruellion,' usually taken as an allegory of humour, and of the Oracle of the Bottle, which answers with the enigmatic solution *Tringa* (drink). The voyages give a satire on every side of contemporary life and culture. This marvellous feast of rich humour and satire, and of profound human sympathy, educational ideals, and learning, is to modern minds defaced by its obscenity and grossness, an essential, it must be remembered, to the humour of the Middle Ages and later. It is frank and open, and has not the prurient nastiness of 18th-cent. wit and satire. R.'s writings reflect the struggle of the Renaissance against the Church, and their improbability and disproportion are but a cloak to cover his attacks. His characters are simple and unrestrained. His doctrine may be summed up as advocating the development of both mind and body, and his rule of conduct was *Fay ce que voudras*. The exuberant humour and



FRANCOIS RABELAIS

been, according to the story, at the convent school of La Baunette, near Angers, with the du Bellays. In 1519 his name is found signing a purchase of the monastery of Fontenay. In 1524 he was licensed to be transferred to the Benedictines at Maillezaix, and in 1530 gave up the regular

rich epic life of his *Gargantua and Pantagruel* doubtless have a deeper meaning than appears on the surface, and R. himself tells the reader that he must 'break the bone in order to suck the marrow' if he wishes to find the hidden truth. In the same passage, however, he alludes to the 'doctrine abscence' and 'mystères horribles' in his story; but this bombast indicates plainly that he is jesting, particularly at the mania of the Middle Ages of trying to interpret all things allegorically. R. relates much merely out of love for his theme, especially the coarse jests and obscenities with which his work abounds, and those who seek some esoteric meaning here will seek in vain; and the opinion that R.'s book is a complicated puzzle cannot be too much guarded against. His style is racy and picturesque, full of original imagery, but his power of verbal invention beguiles him, and then his language becomes a verbal feast of metaphors, neologisms, latinisms, synonyms, and proverbs jumbled together in indigestible confusion. Great writer as he is, R. is quite devoid of any feeling for beauty. The word 'Rabelaisian' connotes writings marked by exuberant imagination and language and coarse humour and satire. The great Eng. trans., a classic in its way, is that of Sir Thomas Urquhart, 1653, completed by Motteux. It has been issued in Everyman's Library (2 vols., 1937). The best Fr. ed. of R.'s works is that of A. Lefranc (5 vols., 1913-31). See Sir W. Besant, *Rabelais*, 1879; L. Saindan, *La Langue de Rabelais*, 1922-3; S. P. Putnam, *Rabelais: Man of the Renaissance*, 1929; L. Febvre, *La religion de Rabelais*, 1943; J. C. Powys, *Rabelais*, 1948; D. B. Wyndham Lewis, *Dr. Rabelais*, 1957.

Rabener, Gottlieb Wilhelm (1714-71), Ger. satirist, b. Wachau, near Leipzig. In 1741 he became a tax official. He wrote for most of the popular periodicals, including the *Bremer Beiträge*. His *Sammlung satyrischer Schriften*, 1751-5, are mildly satirical, marked by their clearness, purity, and aptness. The work was praised by Goethe. See the ed. by C. F. Weiss, 1777; P. Richter, *Rabener und Liscow*, 1884; and study by W. Mühlhaus, 1908.

Rabies, or Hydrophobia (fear of water), fatal disease in animals due to a virus, *Formidius inextinguibilis*. It is transmitted to man by the bite of an infected animal, usually a dog, fox, or wolf. In Latin America the vector is the vampire bat. The incubation period is from 1 to 6 months. The virus gets into the central nervous system, and the disease is characterised by violent muscular spasms, similar to tetanus and affecting mainly the neck muscles. The nearer to the head the victim is bitten, the more virulent the infection. The spasms are increased by drinking, or even the sight of water, hence the name hydrophobia. R. is always associated with the name of Louis Pasteur (q.v.), a French chemist who later turned bacteriologist and, following the work of Jenner, prepared

vaccines against anthrax (q.v.) and cholera (q.v.), made of weak strains of the causative virus which when injected conferred immunity against the infection. He turned his attention to R. and prepared an attenuated R. virus vaccine from the nervous tissues to animals who had died from the disease. In 1885 Pasteur had the chance to try out his new vaccine when he successfully treated an Alsatian boy who had been bitten by a mad dog. He had a further success in a few months in a similar case. These and other results from his experiments led to the establishment of Pasteur Institutes in many parts of the world and to a marked reduction in the mortality of the disease. The vaccine, however, does not produce an antibody response in the patient's blood before 14 days, and, although the incubation period of the disease is long, this represents a loss of valuable time in prophylaxis. In recent years a powerful hyperimmune serum has been developed which has the advantage of producing an immediate antibody response, and thus an immediate high level of resistance to the R. infection. Routine treatment now consists therefore in giving hyperimmune serum and vaccine as soon as possible after infection has occurred. Cauterisation has long been used for the local treatment of bites, but has never been very satisfactory. Lately a new cauterising substance, a 1 per cent solution of benzalkonium chloride ('zephyran') has been found to be more effective. Clearly one means of reducing the incidence of R. is to reduce the numbers of wild animals liable to the infection. The destruction of jackals by poison in Israel and S. Rhodesia has been carried out on a large scale, and in Canada, where an unprecedented epidemic of R. among foxes, wolves, and other wild animals has been in progress since 1953, the chief aim has been to reduce the number of these animals and thus impede the spread of the disease. Immunisation of domestic animals against R. is being experimented with, and is likely to prove a useful preventive measure. Owing to stringent quarantine regulations controlling the importation of domestic animals, and to the fact that Great Britain is surrounded by sea, there has been no case of R. in this country for many years. The last cases are believed to have been in 1917, and were due to a dog owner evading the quarantine regulations. This piece of misplaced affection for a pet resulted in many cases of R. and several deaths, human and canine. This could happen again. See *Report of Expert Committee on Rabies of the World Health Organization*, W.H.O. Technical Report Series, No. 82, 1954; and *Bulletin of the World Health Organization*, 1954, No. 5.

Rabino, Tommaso da, see MODENA.

Rabshakeh, title of the Assyrian gen. (2 Kings xviii, xix) sent by Sennacherib to demand from Hezekiah the surrender of Jerusalem.

Rabutin-Chantal, Marie de, see SÉVIGNÉ, MARQUISE DE.

Racalmuto, tn in Sicily (q.v.), 12 m. NNE. of Agrigento (q.v.). It has salt, sulphur, and quicksilver mines. Pop. 15,000.

Raccahout, Arab word for a farinaceous food prepared from the acorn of the Barbary oak (*Quercus ballota*). The Arabs sweeten it and use it as a form of chocolate.

Racconigi, It. tn in Piedmont (q.v.), on the Maira, 27 m. NNE. of Cuneo (q.v.). It has a splendid royal castle, and has textile manufs. Pop. 8500.

Raccoon, or 'Coon' (*Procyon*), genus of carnivorous animals allied to the mustelids. The common R. (*P. lotor*) ranges over the greater part of the U.S.A., though more plentiful in the S. states. It spends the day in hollow trees, not leaving them until nightfall to hunt for food, which consists largely of young birds, small animals, and also molluscs and other aquatic creatures. It will also eat fruits and berries. It is a handsome animal, resembling an arboreal fox, about the size of a large cat, and an excellent swimmer. The fur is brown in colour, and is long and thick, and consequently valuable. The tail is bushy and about 10 in. long, and is ringed with black and white. The muzzle of the head is sharply pointed, and the ears are small and round. The lt. and the opossum are hunted at night with a pack of dogs trained to their pursuit, the R. being capable of a good pace, and making game fight if overtaken on the ground. The crab-eating R. (*P. cancrivorus*) ranges from Panama throughout a large part of the S. Amer. continent. Its fur is shorter than that of the common R., and its general shape more slender.

Race, Cape, see NEWFOUNDLAND.

Race. It is generally agreed that all men living to-day belong to a single species, *homo sapiens*. They are derived from a common stock, although there is no clear agreement as to how the various groups have diverged from their single common origin. Human populations may broadly be classified by 'race,' each R. being defined by possession of well-developed and primarily heritable physical differences. Because of the great admixture and scattering of peoples in human hist. it is not always easy to fit every pop. into a single racial classification. Racial differences are due to differences in hereditary constitution and to differences in environments; in most cases both influences have been significant. Genetic differences between R.s have been formed by the processes of gene mutation, selection (both 'natural selection' by environment and social selection, e.g. by marriage rules and preferences), and migration and isolation of populations.

The human R.s have been classified according to physical, genetically transmitted characteristics such as hair type, skin colour, cephalic index, etc. Racial classification does not depend on any one of these criteria but on a statistical congruence of all or most of them. They are thus abstractions, and no single

individual member of any R. may possess all the statistically average features associated with his R. Within each R. there is always a wide range of variation, which includes both physical and psychological characteristics and abilities. There is no scientific evidence for any assumption of 'superiority' or 'inferiority' on the part of any R., despite the mythical and unscientific views of so many racialists to the contrary. And there seems to be an equally wide range of intelligence between individuals within every racial group. It is important to emphasise that cultural achievement has little or nothing to do with genetical inheritance of physical characters by individuals, and that social and cultural differences cannot be explained in racial terms. It should, perhaps, be stressed that there are no 'pure' R.s in the world, owing to continual hybridisation; also, contrary to much popular opinion, there are no biologically disadvantageous effects produced thereby.

National, geographical, cultural, linguistic, and religious groupings do not necessarily coincide with racial ones; e.g. Americans, Jews, or those peoples who speak Eng. are not R.s, but geographical, cultural, or religious groups embracing members of different R.s. Another example is that of the Aryan R., which is really merely a loosely defined linguistic grouping, if it is anything.

The most widely accepted racial classification of mankind is into 3 main divs., each consisting of many ethnic groups, the *Caucasoid* or White, the *Negroid* or Black, and the *Mongoloid* or Yellow; within the *Caucasoid* div., and larger than a single ethnic group, is the *Australoid* or *Archaic Caucasoid* sub-div. The main groups within each are:

(1) *Caucasoid*: Mediterranean, Nordic, Alpine, Dinaric, Armenoid, and E. Baltic R.s, all of Europe. The E. Indians of India and the Polynesians of the Pacific are often included in this category; although not all these are white in skin colour. All have similar hair type and other physical characters. Within this div. is the sub-div. of the *Australoids*, *Archaic* or *Proto-Caucasoids*, including 4 interesting and probably related groups, even though so widely scattered: the Australian Aborigines, the Vedda of Ceylon, the Pre-Dravidians of S. India, and the Ainu of N. Japan.

(2) *Negroid*, consisting of the African Negroes (the True Negroes of W. Africa, the Forest Negroes of W.-Central Africa, the Nilotic Negroes and Half-Hamites of E. Africa, the Bantu-speaking Negroes of Central and S. Africa); the Oceanic Negroes of Papua and Melanesia; and the Pygmies (the Négrilles of Africa and the Négritos of the Andaman Islands, Malaya, and the Philippines). Sometimes the Bushmen-Hottentots of the Kalahari Desert are included here, but they are not Negroes but representatives of an archaic stock.

(3) *Mongoloid*, consisting of the Palaeo-Asiatics (the older populations of Siberia,

the Eskimo, and the Indians of the Americas) and the Neosiatatics (Chinese, Koreans, Japanese, Tungus, the Samoyedes and Lapps, and the Indonesian-Malays of Indonesia, Malaya, and Madagascar).

Race Relations. In those parts of the world where different R.s come into close contact there are often conflicts of interests, seen in racial terms. At base these are often essentially economic or 'class' conflicts, but racial characters give an easy criterion for distinguishing members of opposing groups where these coincide, as they often do in colonial and conquest situations. Not that such situations necessarily lead to conflict, as the examples of Hawaii and Brazil, with but little or no racial feeling, show. It must be remembered that similar conflicts have occurred between non-white groups, as in parts of W. Africa before the coming of the Europeans, and between white groups, as in Nazi Germany: in all these cases 'race' differences were held to account for important cultural or economic differences and to be the excuse for political and repressive action by the stronger groups.

The growth of modern racialist theories that hold that there are inherent differences between 'superior' and 'inferior' R.s is very recent. It seems to date from the days of slavery in America, when it was necessary to produce reasons for the continued subjection of economically valuable slaves. Much the same is true of S. Africa to-day, where Calvinist doctrines have given such scientifically false beliefs added support. It is noticeable that in many Catholic countries there has been little racialism, since there doctrine has held to the inherent equality of all men. This fact adds support to the view that 'race relations' are essentially economic and social and that 'race' as such has little to do with the real situation.

See J. Huxley and A. C. Haddon, *We Europeans*, 1936; J. Barzun, *Race: A Study in Modern Superstition*, 1937; J. B. S. Haldane, *Heredity and Politics*, 1938; R. Benedict and G. Weltfish, *The Races of Mankind*, 1943; M. F. Ashley Montagu, *Man's Most Dangerous Myth*, 1952; P. Mason, *An Essay on Racial Tension*, 1954; and U.N.E.S.C.O., series of booklets on Race, by various authors.

Race-meetings, see HORSE-RACING.

Racehorse, see HORSE; HORSE-RACING.

Raceme, inflorescence (q.v.) in which the elongated rachis bears pedicels arranged singly at intervals, each with a flower.

Racemic Acid, $C_4H_4O_4 \cdot H_2O$, optically inactive form of tartaric acid. It may be obtained by evaporating a solution of the 2 optically active modifications of tartaric acid, dextrotartaric acid, and laevotartaric acid. The dextro-rotatory and laevo-rotatory forms compensate each other in the product, which has therefore no action on the plane of polarisation, and is alternatively known as *d,l*-tartaric acid (see STEREOISOMERISM). R. A. melts at $204^\circ C$; its crystals show

some difference in form from those of *d*- and *l*-tartaric acid, but chemically they are identical. Racemates can be formed with various bases; but in the case of the sodium ammonium salt, if it be allowed to crystallise at a temp. below $27^\circ C$, the resulting crystals can be sorted into the dextro- and laevo-forms. R. A. may be synthesised by the action of moist silver oxide upon dibromosuccinic acid:



Rachel, younger daughter of Laban, sister of Leah, and favourite wife of Jacob (Gen. xxix). Jacob was tricked by Laban into marrying Leah to avoid the younger sister's marrying before the elder. R. was also given him on condition of service. R. for long remained childless, but at length bore Joseph. The 2 sisters stood by Jacob in his dispute with Laban and fled with him, R. carrying off her father's teraphim (images) (Gen. xxxix). On their way from Bethel to Hebron R. died giving birth to Benjamin (Gen. xxv. 16-20). R.'s tomb, a white-domed sanctuary, stands to-day on the W. of the road from Jerusalem to Bethlehem, an almost certain site, venerated alike by Christians, Jews, and Muslims.

Rachel, Elisa (1821-58), pseudonym adopted by Elizabeth Félix, Fr. tragic actress of Jewish descent, b. Mülf, Aargau, Switzerland. At the age of 9 she was singing in the streets of Paris, where she came under the notice of Choron, founder of the conservatoire, who took her as a pupil. Her dramatic gifts proved even greater than her vocal, and in 1837 she made her début at the Gymnase in *La Vendéenne*. Her 2 greatest triumphs were achieved in Racine's *Phèdre* and Scribe and Legouvé's *Adrienne Lecouvreur*, in 1843 and 1849 respectively. She met with equal success in her tours abroad, her popularity waning only in 1855 on the advent of Adelaide Ristori (q.v.). See life by J. Agate, 1928; and Matthew Arnold's 3 sonnets.

Rachitis, see RICKETS.

Rachmaninov (Rakhmaninov), Sergei Vassilievich (1873-1943), Russian pianist and composer, b. Oneg, Novgorod, of the old Russian landed gentry, pupil of Zverev, Tanelev, Arensky, and Siloti. From the age of 9 to 11 he studied in St Petersburg Conservatory, afterwards at Moscow Conservatory. After a few years he began to give music lessons for a living. He composed an opera, *Aleko*, for his final examination and obtained the gold medal in 1892. He taught at the Maryinski Institute in Moscow, 1893-6, and conducted private opera in Moscow for Mamontov, 1897-8. The failure of his first Symphony in St Petersburg appears to have depressed him greatly; but in London in 1899 he recovered his spirits when he played and conducted works of his own with success. On his return to Moscow his old dependency returned until 1901, when he was cured by treatment. It was then that he wrote his second Concerto, in C minor, the Preludes

for pianoforte, and some songs. He conducted the Moscow opera from 1904 to 1906, and then spent 2 years in Dresden, with touring intervals. In Dresden he composed his second Symphony, E minor (1907), the first Sonata for pianoforte, the symphonic poem for orchestra, *The Isle of Death*, and the third Concerto for pianoforte and orchestra. After the Russian Revolution he settled in the U.S.A., where he worked as a pianist and conductor. His work consists chiefly of a large quantity of small vocal and instrumental pieces. As a pianist R. stood in the very first rank. See O. von Riesenmann, *Rachmaninoff's Recollections*, 1934; W. Lyle, *Rachmaninoff*, 1939; and J. Culshaw, *Sergei Rachmaninoff*, 1949.

Racial Distinction, see COLOUR BAR.

Racial Segregation in U.S. Schools, Supreme Court Ruling. Ever since the Civil War, discrimination against Negroes has existed in varying degrees in both N. and S. states. However, there has been an increasing, if slow, tendency to end discriminatory practices. On 17 May 1954 a major step in this direction was taken when the Supreme Court ruled that racial segregation in the public schools was unconstitutional. The decision affected 17 states with compulsory racial segregation in schools, and 4 with permissive segregation. Officials in the states affected met the decision with reactions ranging from threats to fight what was felt to be an infringement of states' rights to promises of full compliance. However, the ruling of the court was applauded by N. Congressmen, Negroes, and liberals in general.

Racibórz (Ger. Ratibor), tn in Poland, in Opole prov., 40 m. SSE. of Opole (q.v.), on the Oder. Until 1945 it was in Upper Silesia. It was the cap. of a principality (later a duchy), 1288-1532 and 1822-1918. During the Second World War there was very severe damage. The tn has engineering and chemical industries, and there are magnetite mines in the dist. Pop. 28,000.

Racine, Jean (1639-99), Fr. dramatist, b. La Ferté-Milon (Aisne), the son of a solicitor; educ. at the Collège de Beauvais, at Port Royal, and at the Collège d'Harcourt. He went to Paris, where he made the acquaintance of La Fontaine, Chapelain, Boileau, and Molière. In 1661 he attempted to get a living from his uncle, the vicar-general of Uzès in Languedoc. He married Catherine Romanet, and was made historiographer to Louis XIV. His work previous to this time was very varied. In 1660 he began his career with an ode on the king's marriage, *La Nymphé de la Seine*, and his friendship with Boileau dated from another ode, *La Renommée aux Muses*. His first play, the tragedy of *La Thébaïde, ou les frères ennemis*, was acted by Molière's company at the Palais Royal in 1664 with some success. His second, *Alexandre le Grand* (1665), was produced by the same company, but later given to the rival actors at the Hôtel de Bourgogne, thus leading to a rupture with Molière. His peculiar

genius was revealed in *Andromaque*, 1667; this was followed by the successful comedy of *Les Plaideurs*, 1668, and the tragedies of *Britannicus*, 1669; *Bérénice*, 1670; *Bajazet*, 1672; *Mithridate*, 1673; *Iphigénie en Aulide*, 1674, a masterpiece of pathos; and *Phèdre*, 1677, a particularly painful drama. He was admitted into the Fr. Academy in 1673. His life after his marriage was affluent and happy. He had many literary friends and was for some years gentleman-in-ordinary to the king. His work during this period includes *Esther*, 1689, written at the request of Mme de Maintenon for her schoolgirls at St Cyr; *Athalie*, 1691,



another excellent tragedy; 4 *cantiques spirituels*, 1694; and *L'Abrégé de l'histoire de Port Royal*, 1742, 1767, written in neat and clear prose. R.'s art represents the supreme achievement of classical tragedy. The tragic situation is always based on a psychological crisis, and his insight into the human heart often foreshadows modern psychology. Although R. portrays many passions, such as hate, ambition, pride, the tragedy generally revolves round a passionate love. His artistry is consummate; he was a master at the classical Alexandrine, and he remains unequalled in his dramatic effects, in the variety and purity of his language. Among the best Fr. eds. of his works are those of Count G. Garnier with commentary by M. la Harpe, 1807; J. L. Geoffroy, 1808; Aimé Martin, 1820; Paul Mesnard, 1865-70 (new ed., 1929); A. France, 1874. Eng. trans. by R. B. Boswell appeared in 2 vols., 1889-90. See lives and studies by his son Louis, 1747; Marie Boyle, 1854; G. le Bidois, 1901; F. Mauriac, 1928; A. Tilley, 1933; and A. F. Clark, 1940; also M. Turnell, *The Classical Movement*, 1947; V. Orgill, *A New View of the Plays of Racine*, 1948; E. Vinaver, *Racine et la poésie tragique*, 1951.

Racine, port city, cap. of R. co., Wisconsin, U.S.A., on Lake Michigan 24 m. S. of Milwaukee. It has fisheries and manufs. agric. implements, paints and varnishes, automobile parts, and leather and rubber goods; there are also printing works. Pop. 71,193.

Racing, see **ATHLETICS**; **HORSE-RACING**; **OLYMPIC GAMES**; **ROWING**; **YACHTING**, etc.

Racing, Point-to-Point, see **POINT-TO-POINT STEEPCHASES**.

Rack, instrument of torture, consisting of an oblong frame of wood slightly raised from the ground. At one end was a fixed bar and at the other a movable one (sometimes both were movable). The bar was extended by a windlass until the victim's joints were dislocated, or he died, or answered the questions of his torturers. The R. was known to the Egyptians and early Greeks and Romans. The Duke of Exeter is supposed to have been responsible for its introduction into England, whence it was popularly known as the 'Duke of Exeter's daughter.' It was much used in Henry VIII's and Elizabeth's reigns, but declared illegal in 1628, when it was proposed to rack Charles Felton.

Rack-a-rook, powerful blasting (q.v.) explosive consisting of potassium chlorate mixed with nitrobenzene.

Rack Rent, see **RENT**.

Rackets, Amer. *Raquets* (through Fr. *raquette* from Sp. *raqueta*, a battledore: ultimately, perhaps, connected with Arabian *rdabul*, palm of the hand), game played in an enclosed court with a ball by 2 or 4 persons. The early variety of the game, as described in *Pickwick Papers*, was played on courts open at the sides, and was practised only by the lower classes of the community. This game originated in Eng. jails, and was played by the prisoners against a wall. Robert Mackay, a debtor, was probably the first champion. After 1800 R. began to be taken more seriously, and from a game of skill developed also into one of hard hitting. The racket with which the game is played, and from which it derives its name, is about 2 ft 6 in. long and weighs from 8 to 12 oz., with a head almost circular in form of about 7 or 8 in. diameter, and strung with catgut. The ball, which weighs about 1½ oz., is small, round, and hard. The court is 60 ft long by 30 wide and a coloured line is drawn across the floor 38 ft from the front wall; this is the short line. From the centre of the short line a line is drawn to the centre of the back line, dividing the back portion of the court into right and left courts, while lines are drawn on the floor parallel to the short line and the side wall respectively at a distance of 8 ft from the points where they meet, thus forming 2 squares known as service boxes. The front wall is boarded to a height of 27 in., and has another line at a height of about 9 ft; the former is the play line, the latter the service or 'cut' line, below which no service is allowed. Priority of innings is decided by tossing;

this is a great advantage, as the service often decides the game at R., and only the player who is 'in' or serving can score. The server must have 1 foot in the service box, and must not strike the ball twice. The ball must strike the wall above the service line and fall within the opposite court, after which the server's opponent must return it above the 'board', i.e. the play line, before it has touched the floor twice. When either player fails to return his opponent's stroke or returns it below the board, either an 'ace' is scored to the server or the server is 'knocked out' and his opponent serves as the case may be. Two consecutive 'faults' in serving cause the service to change hands; the service is taken alternately from the 2 boxes so long as 1 player's innings continues. In the cases of unavoidable hindrances or 'lets' (decided by the marker) the server serves again without scoring. A game consists of 15 points or aces; when both players are 13 he who first reached that score has 3 options: either 'no set,' which means that the score goes on up to 15 in the ordinary way (except that another option may arise at 14 all); or 'set three' (game being 16, with no further options); or 'set five' (game being 18 with no further options). At 14 all the first to reach 14 has 2 options: 'no set' (i.e. 1 point only), or 'set three.' When 4 players are engaged the 'receivers' stand 1 in each 'court,' while the server's partner stands by the door in the middle of the back wall. At the beginning of every game the serving side has 1 'hand' only.

R. is played in England, America, and in Canada. It used also to be played in Bombay, Calcutta, Malta, and Buenos Aires. Though not a cheap game to play, the stresses and strains of the 20th cent. have not led to a decline in its popularity, and rising costs have been met by the production of a more lasting ball and a heavier and stronger racket. That such a magnificent game has continued to flourish is primarily due to the efforts of the Tennis and Rackets Association combined with those of the professionals at the leading public schools in England. The present world and Brit. amateur singles champion is G. W. T. Atkins. The present holders of the Brit. Amateur doubles championship are D. S. Milford and J. R. Thompson. See also **SQUASH RACKETS**. See Lord Aberdare (ed.), *Rackets, Squash, Tennis, Fives, and Badminton*, 1933.

Rackham, Arthur (1867-1939), water-colour painter and illustrator, son of Alfred Thomas R., Admiralty marshal. Educ. at the City of London School and Lambeth School of Art, in his twenties he drew illustrations for *Pall Mall Budget* and *Graphic*. He developed a delicately fantastic style, his execution being a matter of ink lines and colour washes, and his subjects, with elves and gnomes, having a Gothic touch. He illustrated eds. of *Rip Van Winkle*, 1905; *Peter Pan*, 1906; *Ingoldsby Legends*, 1907; *Wagner's Ring*, 1910-11; *Dickens's Christmas Carol*, 1916;

Sleeping Beauty, 1920; *The Tempest*, 1926; *Vicar of Wakefield*, 1929; *The Compleat Angler*, 1931; *Andersen's Fairy Tales*, 1932; *The Arthur Rackham Fairy Book*, 1933; *The Pied Piper of Hamelin*, 1934; *Poe's Tales of Mystery*, 1935; *Peer Gynt*, 1936, and many other books.

Racoon, see RACCOON.

Racoonda, name given to the fur of the Coypu (q.v.).

Racquets, see RACKETS.

Radach, Radak, or Ralick, see MARSHALL ISLANDS.

Radar, neologism derived from the phrase 'radio detection and ranging,' and synonymous with 'radiolocation.' Both words were coined to denote a process whereby distant objects are detected, and their directions and ranges measured by means of radio wave echoes reflected back to detecting apparatus, which is often also the source of the waves. In the years preceding 1939, and during the Second World War, enormous progress was made. Fortunately for the Allies their R. was substantially in advance of that of their enemies, and this was certainly a major factor in their success. The uses of R. in peace are likely to be as numerous and as important as in war.

Principles of Radar. A transmitter sends out a short pulse of waves in a certain direction. If the pulse impinges on and is reflected from an object and the reflected pulse is received, say, 2 μ s (microseconds = 10^{-6} sec.) after emission, the object is 300 metres away, the waves travelling at 3×10^8 m./s. To locate an object that is travelling in the given direction, a continued series of pulses are emitted at definite intervals. If, as is usual, the same aerial is used for transmitting and receiving, the intervals must be so timed that a reflected pulse can be recorded before the next pulse is sent out. To get sharp definition of an object, a narrow beam of high power is required. With an aerial of moderate size, this can be attained only at high frequency. Further, a short duration of pulse with well-defined waves is desirable. If a pulse of 0.2 μ s duration is to contain 100 waves, the frequency must be 500 Mc/s. The interval between pulses is determined by the maximum range to be explored. As seen in the above example, the minimum interval for 300 metres range is 2 μ s. The aerial must be directive; if a portion of the surrounding space is to be explored, it must be capable of transmission in various directions. The paraboloid or the paraboloid-cylindrical type is often used, and scanning is achieved by mechanical motion of the aerial. Spiral scanning covers a solid angle of space round a fixed direction, rotation round a vertical axis combined with a vertical rocking motion explores a cylinder round the aerial. Simple rotation round a vertical axis is used on board ships as an aid to navigation. For frequencies up to 600 Mc/s. the transmitter is a valve oscillator (q.v.) with resonant transmission line as oscillatory circuit; for higher frequencies, the magnetron is

used. The receiver is a superheterodyne valve receiver. The signal is usually presented on the screen of a cathode-ray tube. A trigger switch automatically separates the transmitter from the aerial at the termination of a pulse and isolates the receiver during pulse times.

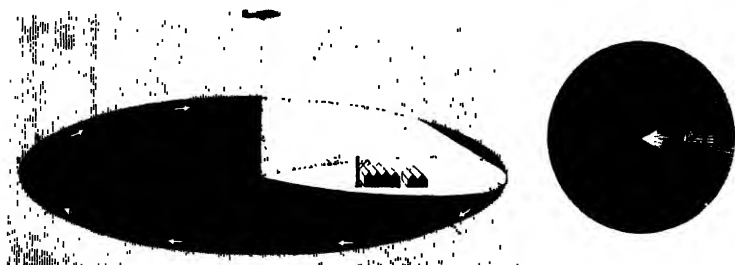
Radar and Air Defence. When the Luftwaffe launched in 1940 its heavy daylight raids on Britain the Germans were in command of a chain of air bases situated only a few minutes' flying time from the Eng. coast. Unless some form of warning system had been in operation to allow the defence to be alerted long before the bombers approached the coast, insufficient time would have been available for fighters to take off, climb, find, and disperse the invaders; defence, in fact, would have been impossible. Fortunately, however, a series of ground R. stations, begun many years earlier, were already functioning, and they supplied information not only of the approach of raiders and their course, but also when and where they were forming up prior to the actual raid. The fighters could therefore take off in good time, and find their way to the best positions for interception. Probably because their own R. was far inferior, the Germans underestimated its value, and made no serious effort to put the R. stations out of action. The heavy losses inflicted on the bombers caused the Germans to change their tactics and resort to night attacks. With the apparatus then in use the interception of night bombers by fighters posed additional problems for the defence. In daylight it was sufficient for the R. controller at the ground station to direct his fighters to the general vicinity of the enemy force, and to leave to the pilots the choice of particular targets. Night fighters carried their own R., but this was of too limited range to allow the same tactics to be used. The controller therefore chose a particular bomber as target, coached a fighter (identified by a special radio identification device) into a position behind and below the bomber, and sufficiently close for the fighter to use its own R. during the further stages of approach and attack. Later improvements of airborne R. made it possible to dispense with the assistance of the ground controller, but the heavy bombing of Britain by piloted aircraft was then already past.

The flying bomb introduced a new menace, for while fighters equipped with R. could, and did, shoot down the flying bombs in suitable weather, there were many days when fog prevented fighters from taking off. Moreover, the bombs could be launched in a steady stream so as to tire out and weaken the fighter defence. Here, however, R.-controlled and R.-directed anti-aircraft fire proved very successful, and before long only a small percentage of the flying bombs directed at London were penetrating to the target area.

Early in the war equipment was developed suitable for attachment to searchlights. This enabled them to locate and

align an aircraft before exposing the light and, once aligned, to follow the target despite its efforts to use cloud cover to escape. This latter method was often employed to light enemy aircraft above cloud as assistance to night fighters in attacking them. The apparatus consisted of a R. transmitter working about 300 megacycles using a directional 'yagi' aerial aligned with the optical beam of the searchlight. Four similar aerials mounted above, below, and either side of the light received the reflected pulses. Alignment on the target was assured once the received signals in opposite aerials had been equalised by steering the light with its aerials towards it. Subsequent development enabled the light to 'follow' the target automatically once the R. beam was directed on it by the crew.

R., moreover, was a vital factor in the attack upon submarines, particularly by aircraft, and its use caused a great decline in the morale of the submarine crews. Although U-boats, to avoid detection by searching aircraft, could cruise submerged during daylight, they had to surface at some time to recharge their batteries. During the early years of the War they ran little risk in doing this at night, but as R. developed it became practicable for aircraft to search wide areas during darkness, while the same R. guided them in high-speed attacks before their prey could submerge. The effectiveness of these attacks convinced the Germans that R. was being employed, and in 1942 they captured intact one of the longer-wave R. sets then used by coastal command. Apparatus was installed in



RADAR: PRINCIPLES OF H₂S SCANNING APPARATUS

An aerial, mounted in a perspex blister on the underside of the aircraft, produces a beam of waves like a fan. It is very narrow in the horizontal plane and very broad in the vertical plane. The aerial rotates once in every second, so that the narrow band sweeps over the ground like the hand over the face of a clock. The reflections from the features of the ground are recorded on a cathode-ray tube, on a radius that revolves over the tube's face in unison with the revolutions of the beam over the ground. So the picture of a feature is left glowing on the tube (right-hand diagram) as the beam goes round over and over again.

Radar and the U-Boats. At the outbreak of war the convoy system was adopted for merchant shipping in the Atlantic. The merchantmen were formed up into a group that steamed faster than submerged submarines could do, while ahead of the merchantmen, spread out as a fan, steamed the naval units of the convoy escort, searching for submarines. Their sound detectors prevented submarines from slipping through the protective screen unobserved, and during daylight this system was highly successful. It could not, however, prevent submarines from surfacing at the side or rear of the convoy at night, and using their superior surface speed to close and launch attacks. The introduction of shipborne R. enabled surfaced submarines to be detected at night or in foggy weather as readily as by day, and its use marked the end of heavy losses in convoy. It also prevented ships from straggling and losing their convoy during the darkness, and greatly reduced the risks of collision.

The U-boats to enable them to detect the R. beam, which now served as a warning, and allowed them time to submerge. The sense of security engendered in the U-boat crews by their detector was rudely shattered when the Allies put into service a new type of R. working on much shorter wave-length (one-tenth metre), and incapable of detection by the Ger. apparatus; in 3 months of 1943 nearly 100 U-boats were sunk, chiefly by aircraft. Only after a prolonged delay did the Germans discover what means of detection was in use by the Allies, and the menace of the U-boats steadily declined during the remaining period of hostilities.

Radar and Naval Warfare. R. has played a large part in solving the special problems of the defence of warships and aircraft carriers against air attack. It has to a large extent revolutionised battles between naval vessels themselves. By its use a fleet can detect the presence of other vessels at night or in fog, can identify them as enemy, engage, and sink

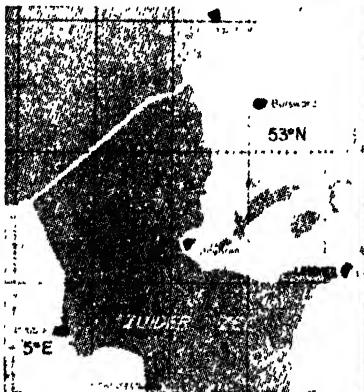
them without ever seeing them except as signals on the fluorescent screens of the R. apparatus.

Radar and the Air Offensive. As a navigational aid in the early Brit. bombing of Germany, radio pulse signals were used, but as the system did not make use of echoes, it should perhaps not be classed as R. Two ground stations in England sent out pulses, and the aircraft carried apparatus that picked up these signals, and after a brief and accurately timed delay, emitted other signals in response. From the delay period between the time when a pulse was sent from, and the response was received at, each ground

parts of their course. The difficult problem of bringing the fighters into contact with the bombers at the appropriate time and place was enormously simplified by R., which, working from friendly ter., allowed a ground controller to follow for some 200 m. the courses of bombers and fighters. With its aid enemy fighters ascending from their aerodromes to attack the bombers could also be detected, and protecting fighters could be diverted to intercept them far from the bomber stream.

See RADIOASTRONOMY.

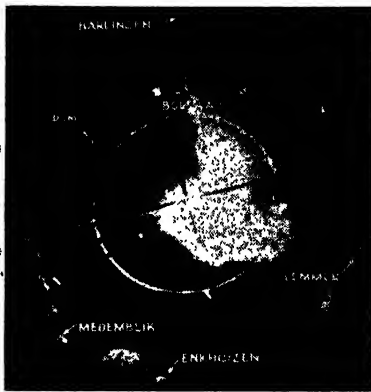
Rădăuți, tn in Bukovina, Rumania, 32 m. S. of Chernovtsy. It has an



THE ZUIDER ZEE ON THE CATHODE-RAY SCREEN

A map of the Zuider Zee and (right) an H₂S picture, taken with scanning apparatus, working on the principles indicated in the diagrams on the opposite page. Apart from the central part, the radial traces are clearly seen, weakest where water does not reflect, strong where there is land below, and strongest where there are buildings.

The diagrams opposite, and the map and photograph, are reproduced from 'Science at War' (Department of Scientific and Industrial Research) by permission of the Controller of Her Majesty's Stationery Office.



station, the distance of the aircraft was known. The accuracy was such that the controller at the ground station knew the position of a bomber over the Ruhr to within a few yards, and could signal to the bomber the appropriate instant for the release of bombs or target flares to serve as markers for other bombers. R. proper, using short waves and an indicator that presented a map of the ground below, was used extensively from 1943 onwards by the heavy bombers of the R.A.F. and U.S. air forces.

R. also provided valuable aid to the long-range fighters sent out to protect Amer. bombers during their daylight operations. Owing to their higher speed and inability to remain airborne as long as the bombers, such fighters could not accompany the bombers throughout their missions, but relays of fighters were dispatched to guard the bombers at various

Orthodox cathedral, and there are machinery, glass, and paper works. Pop. (1930) 16,800.

Radcliffe, Ann, nee Ward (1764-1823), novelist, b. London. In 1787 she married William Radcliffe, editor and proprietor of a weekly newspaper. She pub. her first book, *The Castles of Athlin and Dunbayne*, in 1789, and it deservedly attracted little or no attention. Her next story, *A Sicilian Romance*, 1790, was much better, and Scott said it was the finest modern Eng. example of the poetical novel. This was followed by *The Romance of the Forest*, 1791; the more celebrated *Mysteries of Udolpho*, 1794; and *The Italian*, 1797, an impassioned novel in which the Byronic villain Schedoni plays his part. Her novels are historical only in a formal sense; but she excelled in depicting scenes of mystery and terror, and is one of the most distinguished of the

'Gothic school' of novelists. See C. F. MacIntyre, *Ann Radcliffe in Relation to her Time*, 1920, and A. S. Wieten, *Mrs Radcliffe—her Relation towards Romanticism*, 1926.

Radcliffe, Cyril John, Baron (1899-), lawyer and constitutional authority, educ. at Haileybury and New College, Oxford, and called to the Bar in 1924. He became K.C. in 1936. From 1922 to 1937 R. was a fellow of All Souls, Oxford. Since 1949 he has been a lord of appeal, with a life peerage. An authority on constitutional law, R. was chairman of the Punjab and Bengal Boundary Commissions, 1947. In 1956 he submitted to the Gov. his report on a proposed constitution for Cyprus, which envisaged considerable self-gov. and a possible partition of the is. into Gk and Turkish areas. In 1951 R. gave a notable series of Reith lectures on the B.B.C.

Radcliffe, or Radclyffe, James, see DERWENTWATER, EARL OF.

Radcliffe, John (1650-1714), physician, b. Wakefield. He was educ. at Univ. College, Oxford, became a fellow at Lincoln College, Oxford, in 1669, and began his medical practice in that city. In 1684 he removed to London and was very successful, his patients including William III, Mary, and Anne. He was M.P. for Buckingham, 1713. He bequeathed funds which provided for the building of the R. Observatory and Infirmary, Oxford, the enlarging of St Bartholomew's Hospital, London, and for travelling fellowships in medicine. The R. Camera, the reading-room of the Bodleian Library (q.v.) bears his name. See life by C. R. Hone, 1950.

Radcliffe, tn of Lancs, England, on the Irwell, 7½ m. NNW. of Manchester. The chief industries are cotton-weaving, finishing and dyeing, paper-making, and engineering. Pop. 27,680.

Radcliffe-Brown, Alfred Reginald (1881-1955), anthropologist. Educ. Cambridge; F.R.S., 1950. He did field research in the Andaman Is. and Australia. R.-B. was, with Malinowski, the founder of modern social anthropology, holding chairs at Cape Town, Sydney, Chicago, and Oxford univs. His works include *The Andaman Islanders*, 1922, and *Structure and Function in Primitive Society*, 1952. See ANTHROPOLOGY for account of his influence.

Radeberg, Ger. tn in the dist. of Dresden, 10 m. NE. of Dresden (q.v.). It has a 16th-cent. palace, and manufs. paper, glass, furniture, and beer. Pop. 17,000.

Radegunde, Saint (518-87), Frankish queen, daughter of the pagan King of Thuringia. She was baptised, educated, and eventually married to Clotaire I, the Frankish king. She left him after much ill treatment, culminating in the murder of her brother, and ultimately founded the nunnery of the Holy Cross at Poitiers. Her feast is on 13 Aug.

Radek (real name Sobelsohn), Karl (1885-), cosmopolitan Communist revolutionary of Jewish origin, b. L'vov, which was then in Austria-Hungary.

Before the First World War he was active in the Ger. Social Democratic Party as a leading publicist of its Left wing. During the war he was active in international anti-militarist circles, at the same time being in contact with representatives of the Ger. gov. After the Feb. revolution (q.v.) in 1917 in Russia, R. was in Sweden as a Bolshevik agent. In 1918 he worked among the Spartacists in Germany and was imprisoned. He settled in Russia in 1922 and became a leading functionary of the Communist International. In 1926 he became Rector of the Sun Yat-Sen Communist Univ. for Chinese and other oriental students in Moscow. A leading member of the Trotskyite opposition, R. was expelled from the party and in 1928 banished to the Urals, but was reinstated. In the 1930's he was the chief foreign-affairs commentator in the leading Moscow papers. In 1937, during the Great Purge (q.v.), he was tried together with Pyatakov in one of the big show trials and sentenced to 10 years' imprisonment. He was released after the beginning of the war in 1941, but soon vanished again.

Radetzky, Johann Josef, Graf von Radetzky (1766-1858), Austrian soldier, b. Tzerbnitz, Bohemia, and joined the army as a cadet in 1785. He served in the Turkish and revolutionary wars, and was made a colonel in 1799. In 1805 he was promoted to major-general, and in 1809 lieutenant-field-marshal. He took part in the battles of Trebbia, Novi, Marengo, Aspern, Wagram, Leipzig, etc. His chief claim to fame rests on his masterly defence of the Quadrilateral (q.v.), and his subsequent crushing victories at Custozza and Novara over Charles Albert, King of Sardinia. See life by E. Schwahl, 1938.

Radewormwald, Ger. tn in the Land of N. Rhine-Westphalia (q.v.), some 10 m. SE. of Wuppertal, manufacturing machinery, general hardware, and woollens. Pop. 16,640.

Radhakrishnan, Sir Sarvepalli (1888-), Indian philosopher and educationist in England. Educated at Madras Christian College, he was prof. of philosophy, Presidency College, Madras, 1916-17; George V prof. of philosophy, Calcutta, 1921-31 and 1937-41; and vice-chancellor of Benares Hindu Univ., 1939-48. R. was also a member of the international committee on intellectual co-operation of the League of Nations, 1931-9, a fellow of All Souls, Oxford, and member of the Constituent Assembly for India. He was knighted in 1931. Among his numerous pubs. are *The Reign of Religion in Contemporary Philosophy*, 1920; *The Philosophy of the Upanishads*, 1924; *The Hindu View of Life*, 1927; *East and West in Religion*, 1933; *Eastern Religions and Western Thought*, 1939; *Religion and Society*, 1947; and *The Bhagavad-gita*, 1948.

Radial Artery, artery in which the pulse is felt at the wrist. The brachial artery on passing the elbow divides; the 2 branches follow the radius and ulna

respectively. The former reaches the wrist near the surface, runs to the back, then forward into the palm of the hand, where it joins a branch of the ulnar artery.

Radial Engine, see AERO-ENGINES.

Radiant, see METEOR.

Radiation. The ramifications of the subject of R. extend to all branches of physical science. Whether heat, light, electricity and magnetism, matter and its properties, astronomy, or astrophysics are concerned the questions concerning R. and matter are the ultimate ones to be answered. Since the time of Clerk Maxwell (q.v.) we have come to know that all R.s are electromagnetic in character and that they are all propagated with the same velocity, that of light, namely 186,283 m. per sec. *in vacuo*. The shortest wave-length R.s known are the gamma-rays (q.v.) emitted from radioactive bodies during their spontaneous disintegration, being of the order of 10^{-10} cm. In the scale of wave-lengths they are followed by X-rays, the hardest of which have a wave-length of the order of 10^{-8} cm., while the softest and least penetrating X-rays have a wave-length of the order of 10^{-3} cm. Ultra-violet R. from mercury arcs is of the order of 10^{-6} cm., while the ultra-violet R., the wave-length of which is just too short to cause the sensation of sight, is 4×10^{-7} cm. The visible spectrum consists of R. of wave-lengths between 4×10^{-7} cm. and 8×10^{-6} cm., while the infra-red R. that produces a sense of warmth, but does not cause the sensation of sight, extends from 8×10^{-6} cm. to waves of much greater length. The shortest wireless waves are 10^{-3} cm. long, and the longest are of the order of 10^4 cm.

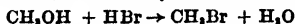
In the article on SPECTRUM reference is made to the present theories of the origin of visible R.s as well as the origin of ultra-violet and infra-red R.s, while in the article on X-RAYS the origin of that form of R. is discussed. It is interesting to trace the development of the knowledge of the infra-red R.s, known as radiant heat, because it led directly to the quantum theory of R. The researches of Melloni and Tyndall during the earlier part of the last century revealed the fact that those R.s from hot bodies that are responsible for producing the sensation of warmth are identical in character with ordinary light. That is to say, radiant heat obeys the laws of refraction, reflection, etc. Newton had made an attempt to determine the law governing the rate at which a body loses heat, and he discovered that the rate of cooling varied directly as the difference of temp. between the cooling body and its surroundings. Dulong and Petit subsequently discovered Newton's law to be only approximately true, but they, too, were really dealing with the cooling of a body under other influences besides R., such as conduction and convection. In simplifying the nature of the problem and in concentrating on the loss of heat of a body by R. alone, 3 names stand out

from all others, viz. Prévost, Stéfán, and Planck. Prévost enunciated the Law of Exchanges that recognises that all bodies are simultaneously and continuously losing heat by R. Thus a cold object brought into a warm room is losing heat by R. to the room, but it is absorbing heat radiated from the room at a faster rate, and the net result is that the temp. of the cold body is raised to that of the room. Even then R. does not cease; the exchange still proceeds, but the body now radiates heat at exactly the same rate as that at which it receives it from the room, and the net result is no change in its temp. In developing this law of Prévost, Halfour Stewart, and Kirchhoff were led to the consideration of the nature of the R.s from bodies inside an enclosure that was impervious to heat. It follows that a stage is reached at which, by the exchange of radiant energy, all the bodies reach the same common temp. It also follows that there can be no subsequent changes of temp. within that enclosure, so that every body is receiving heat at exactly the same rate as that at which it is radiating heat. Now it is fairly well known that a black body absorbs radiant heat more readily than a white body or a polished body under identical circumstances. The black body is black because it absorbs practically all wave-lengths that fall on it, just as a white body is white because it reflects practically all wave-lengths that fall on it. But in an enclosure like the one described above it is clear that, when all temp. differences have disappeared, the black body radiates all wave-lengths that it absorbs as its temp. remains unchanged; the white body reflects and radiates all the wave-lengths that fall on it. In fact, the net R.s from all bodies within such an enclosure are identical and include all wave-lengths. Such R. is known as 'black body' or 'full' R. It is the R. that would be emitted by a body perfectly black under the same circumstances. The law of R.s now sought was the law of black-body R., and Stéfán discovered that the R. within such an enclosure followed the law that now bears his name and also that of Boltzmann, who established Stéfán's empirical law from theoretical considerations: The rate at which a perfectly black body radiates heat is directly proportional to the fourth power of its absolute temp. (q.v.). See also COSMIC RAYS.

Research now proceeded rapidly, and by means of the bolometer and radiometer it was possible to examine the distribution of the radiant energy from a body among the wave-lengths in the spectrum. The result of the experimental researches could not be accounted for by the existing dynamical laws, and Planck was led to formulate the now famous quantum theory (q.v.) in order to account for this distribution. For further reading see the references at the end of the article on HEAT.

Radiators (Heating), see ELECTRICITY IN THE HOME, *Electric Heaters*; HEAT, *Modes of Transference of Heat*; HEATING.

Radical, in chem., denotes a grouping of atoms which occurs as part of a mol. and is transferred as a whole in a chem. reaction without disintegration, as, for example, the methyl radical ($\text{CH}_3\cdot$) in the esterification of methyl alcohol.



R.s were shown to be capable of free existence, but owing to their great reactivity, they are only short lived. In 1900 Gomberg prepared triphenyl methyl ($\text{C}_6\text{H}_5\cdot$), in which one of the carbon atoms has only 3 of its 4 possible valencies in use. The free valency is a single unpaired electron which accounts for the reactivity of the free R. Later other free R.s were produced, e.g. methyl by heating lead tetramethyl with a free life period of a hundredth of a second, ethyl and inorganic R.s such as H, O, and Cl. Combination of free R.s involves the release of a large amount of energy, and use has been made of this in welding, the energy released from the combination of H atoms being used to melt the refractory metals. Cl atoms can be produced by the action of light on chlorine gas, and it is the presence of these R.s that makes the reaction between hydrogen and chlorine explosive. The photochemical bromination of toluene to give benzyl bromide is a chain reaction which can be inhibited by oxygen, and this effect indicates the formation of the free benzyl R., $\text{C}_6\text{H}_5\text{CH}_2\cdot$. It has also been formed in the vapour-phase reaction between benzyl chloride and sodium. Chemical study of free R.s is not easy, but spectroscopic study has revealed a great deal about their structure. Spectroscopy has been used to follow free R.s in ordinary chemical reactions over the short period of time they exist in the free state. In this way much information has been gained about the OH radical. The presence of the odd electron in free R.s gives them a definite magnetic moment, which can be measured, and makes them paramagnetic. Measurement of magnetic susceptibility for the detection of free R.s has thus been developed, and this has led to the determination of dissociation constants and heats of dissociation of the mols. which provide those free R.s. It is estab. that free R.s play an important role in many reactions. Thus acetaldehyde vapour is stable at 300°C . but decomposes immediately on the introduction of a little azomethane as the latter yields methyl R.s which start a series of chain reactions. On the other hand, the rapid reaction between oxygen and hexaphenylethane is doubtless due to a chain reaction, but this can be inhibited by the introduction of excess pyrogallol, since the triphenylmethyl peroxide R. oxidises the pyrogallol. The importance of free R.s in industry lies in the influence they have on the mechanism of industrial processes. Cracking of higher hydrocarbons to give, for example, petrol involves the breaking of larger mols. into free R.s followed by recombination of these R.s to require smaller mols. Plastic

manuf. depends on the formation of a polymer from free R.s until another free R. appears and ends the reaction.

Radical, in politics, term which came into general use as a synonym for 'Liberal,' but is capable of application to any politician or political supporter whose political creed involves some root-and-branch reform. In England the term historically applies to the political reformers of the last decade of the 18th cent. and the earlier period of the 19th cent. The R. proper may be said to have been partly the product of the ideas germinating in Europe from the philosophy of Rousseau after the Fr. Revolution, and partly an inevitable outcome of the rising tns. The name R. reformers appears first to have been assumed by Hunt, Cobbett, and others of this period, who were bent on influencing the people at large in the direction of great and popular constitutional changes. By the time of the Reform Bill, 1832, the R.s had gained a definite and permanent footing in the House of Commons, where they were represented by at least 55 members. From this time forward the term became gradually interchangeable with 'Liberal.' See LIBERAL PARTY.

Radiguet, Raymond (1903-23), Fr. novelist, b. Saint Maur. He began writing while still in his teens, and at the age of 14 already composed good poetry. His fame rests on his two novels, *Le Diable au Corps*, 1923, and *Le Bal du Comte d'Orgel*, 1924. His style is remarkable for its classical restraint and lucidity. Had he lived, R. would probably have produced work of lasting value. Both his novels have been trans. into English. See H. Massis, *R. Radiguet*, 1929.

Radio Altimeter, device for determining the height of an aeroplane above ground. A transmitter on the aircraft sends out a frequency-modulated wave which is reflected from the ground back to a receiver on the aircraft. The receiver also records the emitted wave directly received from the transmitter, but at the arrival of the reflected wave the direct transmitted signal is at a different stage of modulation; at any moment the instantaneous frequencies of the 2 signals are different, and the superposition of the 2 frequencies produces a 'beat note' in the receiver output. The frequency of the beat depends on the difference in instantaneous frequency, and this depends on the time delay of the reflected wave with respect to the direct signal, i.e. on the time taken for the wave to reach the ground and return. Thus a beat-frequency meter in the receiver can be graduated to read the height in ft.

Radio Astronomy. Radio waves emanating from regions of space outside the solar system were discovered by Karl Jansky working at the Bell Telephone Laboratories in 1932. He suggested that they originated in the rarefied gas which fills interstellar space. The great significance of this discovery was not appreciated until it became possible to study the phenomenon with the highly sensitive

radio techniques which were developed during the Second World War. In 1948 it was found that the most powerful sources of these radio emissions were in 2 localised sources lying in the constellations of Cassiopeia and Cygnus, and since that time several thousand of these radio sources or 'radio stars' have been discovered. The relation of these sources of radio waves to the universe visible in the big optical telescopes is not yet clear, since no prominent astronomical objects (except the sun) are known to emit radio waves. In fact, only about one dozen of the radio sources have so far been identified with known astronomical objects. Some of these are in the local Milky Way system. For example, the most intense source in Cassiopeia has been identified as a very faint diffuse gaseous nebula, and the source in Taurus with the Crab Nebula (the supernova of AD 1054). Others are extra-galactic, the most remarkable being the source in Cygnus, which has been identified with a collision of 2 nebulae at a distance of 200,000,000 light years—a distance which is near the limit of penetration of the 200-in. Palomar telescope.

These sources emit radio waves over a wide range of wave-lengths, and they have already been studied from a few cm. to about 20 metres. On the other hand, another type of radio emission was discovered in 1951—the spectral-line emission from the clouds of neutral hydrogen gas in interstellar space. This is on a specific wave-length of 21 cm., but when received on the earth the wave-length is shifted because of the Doppler effect, since the hydrogen clouds are in motion relative to the solar system. The study of this hydrogen-line emission at Leiden has led to remarkable results, since it provides a means of investigating the regions of the Milky Way system, in the neighbourhood of the galactic nucleus, which are obscured from view by the dust clouds in space. Radio waves are also emitted by the sun. Under normal conditions these originate in the highly attenuated solar corona. On the other hand, when sun-spots and solar flares are present the radio emission becomes very intense.

Another important aspect of R. A. is that in which radio waves are emitted from the earth and their reflections observed from various celestial bodies. The techniques are essentially similar to radar, and the use of ex-army radar apparatus, immediately after the War, for the detection of meteors produced remarkable and unexpected results. Meteors are very small particles, mostly like specks of sand or smaller, which revolve around the sun in various forms of elliptic orbits—usually very eccentric—so that their velocity at the distance of the earth from the sun is about 26 m. per sec. As the earth's orbital velocity is 18½ m. per sec., the actual velocities of encounter with the earth may vary between about 7 and 44 m. per sec., but since the earth's gravitational attraction accelerates the speeds of these bodies, more especially the slower ones, the velocities

lie between 10 and 45 m. per sec. When the meteors enter the atmosphere the collisions which they suffer with the air molecules bring them to the temperature of evaporation, which generally takes place in the height range of about 50–75 m. The energy is spent in heat, light, and ionisation. The light gives the well-known visible streak, and the free electrons in the trail reflect the radio waves back to the earth, and so meteors can be studied when the sky is clouded over and even by daylight. Meteors can be seen only by night, and hence if the 'radiant'—a term well known to all meteor observers—rises and sets about the times of sunrise and sunset, respectively, although there may be very extensive showers, visual observation could not detect them. A well-known shower takes place in the early morning hours, soon after the radiant rises, during the first week in May, and is known as the γ -Aquarids, but it cannot be seen for long, owing to sunrise soon after its activities are observed. In 1947 radar was used at Jodrell Bank, the research station connected with Manchester Univ., to observe this shower, and not only was it successful during daylight, but it was found that there were other meteor showers much more prolific, which had not previously been known. Throughout May, June, July, and Aug., other daylight showers of great intensity were discovered of which nothing had been suspected before the use of radar, and subsequent work in later years has confirmed the earlier discoveries. It is now possible to study meteors by radar by night or by day, and further research on these minute specks, many hundreds of millions of which strike our atmosphere every day, may yet assist the cosmologist in his speculations regarding the origin of the solar system, on which there is still no consensus of opinion. In addition to these cosmological studies, the radio echo studies of meteors have been developed as a new method for investigating the wind systems, and for measuring the physical condition of the atmosphere at these heights, which are otherwise accessible only to rockets.

Finally, other forms of the radio-echo technique have been used to obtain echoes from the moon (q.v.) and from the artificial satellites (see ROCKETS), and valuable information is now being obtained about the ionosphere by using this method.

Specialised electronic instruments have been developed for these various studies in R. A. The most notable feature of the apparatus is the aerial system or radio telescope. During the last few years there has been a marked trend to very large radio telescopes, since size is important for the same reason that large optical telescopes are necessary, that is for sensitivity and resolving power. A completely steerable radio telescope with a parabolic steel bowl 250 ft in diameter has been built at the Jodrell Bank Experimental Station of the Univ. of Manchester. The bowl weighs 700 tons and

is supported 180 ft above the ground. Sev. similar, though smaller, instruments of 60-80 ft in diameter are in operation elsewhere, and telescopes comparable in size to the Jodrell Bank instrument are now planned for Australia and America. See ASTRONOMY; RADAR.

Radio Beacons consist of aerial, receiver, and pulse transmitter. If a ship or an aircraft sends out a signal received by the R. B., the receiver output triggers the pulse transmitter, which then emits a pulse of known code pattern received by the ship. The beacon is identified by the code, and the distance can be determined from the time delay of reception. The R. B. are used for identifying landing-fields, coast-lines, or other geographical features. In *short-range* (Shoran) navigation 2 R. B. of known geographical positions are used. From signals received from both beacons at the same time, the precise location of the aircraft or ship can be determined. In *long-range* (Loran), 2 pairs of R. B., AA' and BB', are so placed that the distances AA' and BB' are about 300 miles. A and A' send out pulses of the same pattern, but the emissions from A' are delayed by a certain known constant time-interval. If a ship receives these pulses with precisely that time interval, it is at equal distance from A and A'. If the interval of reception differs from the interval of emission, the ship is on a hyperbola with A and A' as foci—a hyperbola being the locus of points whose distances from 2 points differ by a constant amount. The particular hyperbola can be determined from measurement of the time interval and determination of the difference in distance. Signals from the similarly operated B and B' beacons determine a second hyperbola, and the intersection places the ship.

Radio-carbon Dating. The new science of atomic fission has furnished an absolute time-scale by which archaeologists can date cultures of the past. Living bodies contain radioactive substances which spontaneously emit radiations and break down into other substances in a period of time which is characteristic for each radioactive element. Radioactive substances also persist in dead bodies for long periods of time, and it is possible by studying the radioactive content of such organic substances as bone, wood, charcoal, and horn to determine their age. The element currently investigated is radioactive carbon, known as Carbon 14 to distinguish it from the ordinary carbon of atomic weight 12. On the death of an organic body it ceases to exchange carbon dioxide with the atmosphere around it. The disintegration of Carbon 14 continues, however, and the process continues at a fixed rate of change which can be measured by a mathematical formula. See ARCHAEOLOGY. A list of authoritative pub. on R-C. D. is given by Sir Mortimer Wheeler in *Archaeology from the Earth*, 1954, pp. 34-6.

Radio Compass, a direction-finding (q.v.) aerial by which a ship or an air-

craft can obtain its bearing with respect to a beacon of known geographical position.

Radio Drama, term applied to forms of dramatic writing intended for, or adapted to, broadcast production. In the early days of broadcasting it was found that of all types of broadcast programme drama required the most careful adaptation to the medium. The broadcast of the stage production of a play is liable to become bewildering to a listener who cannot see the action fitted to the words. New techniques of writing and production were developed, and what was virtually a new art form came into being. Valuable work was done by the 'Columbia Workshop' studios in the U.S.A. In Great Britain, after 10 years of broadcasting, R. D. reached a degree of elaboration which made Brit. broadcasting prominent in this field. This result is to be credited to the invention of the dramatic control panel. The various parts of a play, pieces of dialogue, sound effects, music, etc., may be enacted in separate studios, and the producer operating the dramatic control panel is able to bring to the listener the output of each studio either in sequence or simultaneously as may be required in presenting the play as a whole. This is known as the multiple studio technique. The process of switching from one studio to another, the equivalent generally of changing from one scene to another, is called the 'fade,' sound being faded in or faded out, abruptly or gradually, as the action of the play may demand. In an early radio play by Val Gielgud entitled *Exiles*, broadcast by the B.B.C. in 1930, as many as 8 studios were used. The technical possibilities of R. D. were so tempting in the early days of experiment, a period which may be put, say, between 1928 and 1935, that there was some danger of over-elaboration. This brought a reaction, partly one of taste, but mainly in Great Britain the result of broadcasting under war-time conditions from 1939 to 1945. Simplification became a practical necessity. At the same time the potential audience for R. D. enormously increased. During the war years many other forms of entertainment were curtailed, with the result that more and more people turned to broadcasting to satisfy their interest in plays of all kinds. R. D. gained, and has since kept by its merits, a popularity which would have seemed visionary to the experimenters who laid the foundations in the early thirties. While some forms of drama are more appropriate to the stage than to radio, it is equally true that there are other kinds for which broadcasting is a more effective medium than any other. Fantasy, expressionistic drama, the play of illustrated discussion, find a natural medium in radio. The opening of a radio play should be such that interest is aroused at once. Time and place must be clearly 'exposed,' and all characters should be easily identifiable throughout. The play is likely to be most successful which proceeds surely from its initial action through a series of well-

conceived minor climaxes to a major climax. Among other technical requirements are the following. Entrances and exits may be covered with lines or sound. All action should be adequately motivated. As a rule short speeches are preferable, and the style of writing should be taut and to the point. There should be no unnecessary characters. In a stage drama the audience may be easily transported from one scene to another by visual representation. In R. D., while there is no limit to the scenes in which the action may be laid, the producer has the problem of deciding the technique he should employ to direct the imagination of the listener. Sound effects, informative dialogue, music, or narration may be employed, or any combination of these. Ideally each of these techniques has its particular application. Sound effects are often useful to indicate either a change of locale or the movement of characters from one scene to another, but too great a dependence on their efficacy may weaken their dramatic purpose. Music is invaluable for giving the desired emotional tempo, and in many successful radio plays, e.g. *Music for Miss Rogers*, 1944, by Margaret Gore Brown, and *Music at Dusk*, 1939, by Val Gielgud, it is used as an intrinsic part of the action rather than as an extraneous device. In some types of play narration is the only right means of setting the scene and linking the action; in others it is a confession of defeat. To be suitable for broadcast transmission a play should have a plan as definite as a proposition in Euclid, for the producer can hardly create an effective programme in sound unless he is clear on the plan. Having clearly ascertained the outline of the plot, the producer can proceed to plan the pacing, tempo, and interpretation of the whole play on that basis, making evident which scenes are merely expository, imparting facts which the audience need to know, and which are vital in the element of conflict in the drama. It is from this study of structure that the producer arrives at his conclusions about characterisation, interpretation, and casting. Many broadcast plays are, of course, plays originally written for the stage and adapted to the new medium, but many are written in the first instance as radio plays. A number of writers, among whom may be mentioned Philip Wade, Du Garde Peach, Mabel Constanduros, and Norman Edwards, have gained a reputation principally as radio playwrights, while many others, whose main effort lies in other directions, have experimented successfully in this medium. The opinion is expressed by competent authorities that R. D. as such can and will survive in competition with television. In late years also R. D. has given a new-found popularity to the play in verse, and in this connection mention may be made of the work of Louis MacNeice, Geoffrey Bridson, Edward Sackville-West, and Dylan Thomas.

Radio Frequency Heating. *see* DIELECTRIC HEATING; FURNACES.

Radio Range, transmitter system marking a certain course of aircraft flight. In one type, 4 vertical aerials, A, B, C, D, are placed at the corners and a fifth, M, at the centre of a square. The centre aerial emits at 200–400 kc/s. A second transmitter works at a frequency differing by about 1 kc/s from the former and the output is supplied alternately to the pairs AC and BD. The signal from M and that from either A and C or B and D, being of different frequency, produce a beat note in the receiver of the aircraft, the intensity of which depends on the intensity of radiation from the pair emitting at the moment. If the aircraft is equidistant from A and B or from B and C, i.e. on the line bisecting AB or that bisecting BC at right angles, the beat intensity is independent of the alternation. Another type uses a transmitting system producing a horizontal intensity pattern of cardioid or limaçon shape, with a sharp minimum in one direction. The pattern is rotated at about 30 revolutions per sec. and produces a pulsating-amplitude signal in the receiver. When the maximum of the emission pattern points N. the radiation is momentarily blacked out. The phase angle of the 30 c/s modulation at the receiver gives the bearing of the transmitter with respect to the aircraft.

Radio Receiver, *see* RECEIVERS, RADIO and RADIOCOMMUNICATION.

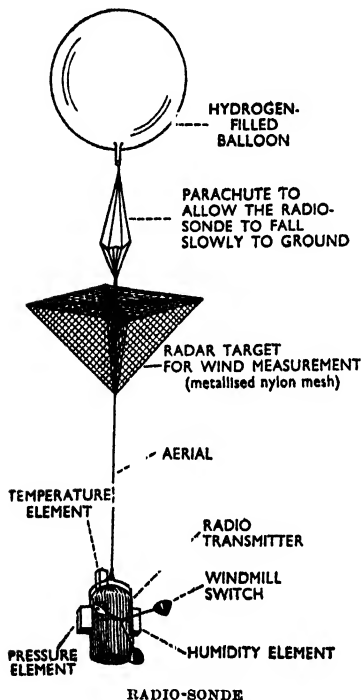
Radio-sonde, an instrument now used by all the major meteorological services for measuring pressure, temp., and humidity of the atmosphere to great heights. Sev. different patterns are in use. The Brit. R. consists essentially of free balloon carrying instruments for measuring pressure (an aneroid, q.v.), temp. (a bimetallic strip), and humidity (goldbeater skin). The mechanical movements of these instruments are made to cause changes in the electrical constants of a small radio set which transmits signals to a receiver on the ground. Changes in the frequency (pitch) of the signals are interpreted as changes in the values of the meteorological elements as the balloon ascends. The latest development is the Brit. *radar-sonde*, the most advanced instrument of its kind in the world. This not only measures pressure, temp., and humidity but also wind speed and direction at the same time. The values of the wind are computed automatically as the balloon ascends, and readings at heights in excess of 100,000 ft have been obtained. *See* METEOROLOGY; RADAR; ROCKETS.

Radio-therapy, *see* RADIUM.

'Radio Times,' weekly journal of the British Broadcasting Corporation, first issued on 28 Sept. 1923, 10 months after the beginning of an organised broadcasting service. The first issue sold 200,000 copies, and by 1935, when there were 7,000,000 licence-holders, a weekly sale of 2,500,000 copies was achieved. R. T. is pub. in 7 eds., and has an average weekly sale of 8,800,715—the highest in the world for a weekly pub. It contains all Home, Light, Third, Network Three, and B.B.C.

Television programmes, with illustrated articles and advertisements. The Home Service and, occasionally, television pages are regionalised on the same scheme as B.B.C. broadcasting.

Radio Transmitting, *see* TRANSMITTERS, RADIO.



Radio Waves, Propagation. R. W. represent an electromagnetic field travelling with the velocity of light from the aerial into space. At any point, the field is defined by an electric and a magnetic force (vector) at right angles to one another, the direction of propagation being perpendicular to both. If the electric force is vertical, the wave is 'vertically polarised.' A certain minimum field strength, expressed in microvolts per metre ($\mu\text{V/m.}$) is necessary for satisfactory reception. The field strength is normally decreasing with distance from the transmitter (attenuation) and is affected by any conducting substance present, such as the surface of the earth or ionised regions in the atmosphere, and the waves are refracted and reflected by variation in the characteristics of the atmosphere. Waves emitted from a vertical aerial near the ground are

vertically polarised and travel parallel to the surface. At low frequencies they suffer little attenuation. From elevated directive aeriels, space waves are emitted at high frequency travelling direct to the receiving aerial. The waves travelling upwards in the atmosphere are reflected from the ionosphere (q.v.). Eccles (1912) first called attention to the part the ionosphere might play in R. W., and Larmor (1924) worked out the theory in detail. The reflected wave is known as the sky wave. At frequencies of 20–100 kc/s. the sky wave is reflected near the lower boundary of the ionosphere, the ground wave is but very slightly attenuated, and transmission is not subject to diurnal or seasonal variation. As the frequency increases, attenuation becomes greater and signal strength at longer distance is more variable. Transmission at broadcast frequencies depends on ground waves in day-time, the sky wave being absorbed in the ionosphere. At night there is appreciable sky-wave reflection at longer distances from the transmitters, while the ground wave is attenuated. At higher frequencies the ground-wave intensity becomes inappreciable at short distance, and high-frequency communication depends on the sky wave. The reflexion of high-frequency waves in the ionosphere is dependent on the varying conditions in the different layers, and these are affected by sun-spot activity, magnetic storms, and subject to diurnal and seasonal variations. Thus the high-frequency telephone connections across the N. Atlantic may be interrupted for sev. days during heavy magnetic storms. *See* RADIOCOMMUNICATION.

Radioactivity refers to the phenomena that accompany the spontaneous transmutation of unstable elements. There is a fairly large number of naturally occurring radioactive substances, classified in three distinct series—the uranium series, the actinium series, and the thorium series. The phenomenon was first discovered in 1896, when Becquerel observed that some photographic plates, although securely wrapped up, became fogged when placed in close proximity to certain uranium compounds. A closer investigation showed that thin metal coverings were unable to prevent the fogging of the plates. It was supposed that the uranium compounds emitted some radiations, known at that time as Becquerel rays (q.v.), that were able to penetrate such coverings opaque to ordinary light. Becquerel's discovery of this natural phenomenon closely followed Röntgen's discovery of X-rays (q.v.), and since the fogging of photographic plates was common to both these new types of rays, intensive research was begun on the compounds of uranium. M. and Mme Curie soon succeeded in isolating a new element far more active, in the sense described above, than the original uranium. This element was named polonium; shortly afterwards, by a brilliant piece of chemical research, they separated another new and much more powerful radioactive

element, radium. While research was continued, with the result that the actinium and thorium series were discovered, attention was directed to investigating the nature of these mysterious radiations. It was found that they caused certain substances, notably barium platinocyanide and zinc sulphide, to phosphoresce, just as X-rays did, but in 1899 Rutherford made the first of a series of important discoveries that estab. him as the foremost investigator in this branch of physics. He found that the radiations from these substances were complex in character. Some of the rays were absorbed by very thin sheets of aluminium (c. 0.002 cm.) or by a few centimetres of ordinary air: to these he gave the name alpha-rays or α -rays. The more penetrating radiation that could pierce sheets of aluminium sev. millimetres thick he called beta-rays or β -rays. There remained a third type of radiation that Villard first discovered (in 1900) could penetrate thick blocks of aluminium and even layers of lead sev. centimetres thick that easily absorbed both α - and β -rays; to these the name gamma-rays or γ -rays was given.

α -Rays are now known to be the charged nuclei of helium atoms (see NUCLEUS), and they are expelled from radioactive substances with a velocity about $\frac{1}{10}$ of the velocity of light. The charge carried by an α -particle is equal in magnitude to twice the charge on an electron (q.v.), but is positive.

β -Rays are fast electrons. The velocities with which they are expelled from radioactive substances are very near the velocity of light, 3×10^{10} cm. per sec., i.e. 186,000 m. per sec.

γ -Rays are electromagnetic waves (q.v.) of very high frequency. Light waves in the visible spectrum have wave-lengths of the order of 10^{-5} cm.; X-rays have wave-lengths of the order of 10^{-8} cm.; the 'hardest' γ -rays have wave-lengths of the order of 10^{-11} cm., and they are the shortest waves known, being at the opposite extreme of the scale of electromagnetic waves from the long wireless waves.

α -rays and β -rays can be deflected by electric and magnetic fields, a fact that led to the discovery of their real nature, but γ -rays do not suffer such a deflection.

Rutherford and Soddy's Theory of Radioactive Disintegration. The three types of radiation from radioactive bodies have one feature in common: they ionise the air they traverse by knocking out one or more electrons from the atoms of the gas. This led to an easy method of determining the intensity of such radiations by measuring the degree of ionisation produced by means of a sensitive electrometer (q.v.). Rutherford and Soddy found that the 'activity' of any radioactive substance gradually decreased according to a definite law. If T_0 is the measure of this activity at some arbitrary zero of time, then after a time t the activity was found to be given by $T = T_0 \cdot e^{-\lambda t}$. The theory they proposed

was that the activity was directly proportional to the number of radioactive atoms breaking up per second. In other words, if N is the number of radioactive atoms present in a sample of the substance at any time t , then $N = N_0 \cdot e^{-\lambda t}$, where N_0 is the original number of radioactive atoms, and we deduce by simple differentiation (see DIFFERENTIAL CALCULUS) of this last equation with regard to the variable t , $\frac{dN}{dt} = -\lambda N$, i.e. the

rate of decrease of the number of radioactive atoms in any sample is directly proportional to the number of such atoms present. λ is known as the *Radioactive constant* of the given atom. The time for half the atoms to suffer disintegration is termed the *half-life* of the atom. This law of radioactive disintegration is simply a law of probability, that is, the disintegration of radioactive atoms is spontaneous and governed only by the laws of chance. No known chemical or physical agency can control, increase, or diminish the rate of this disintegration, apart from disrupting the nucleus by bombarding it with high-energy protons or other atomic particles. If radium, for example, is subjected to fierce heat or the extremities of cold produced by immersion in liquid hydrogen, the disintegration is not affected. Or, again, if radium is caused to enter into chemical combinations to form radium salts, such as radium bromide or radium chloride, the rate of disintegration is not affected.

Rutherford and Soddy's law is found to hold good also in more complex cases where sev. radioactive substances are present at the same time, and there is no doubt that the phenomena of R. arise from the breaking up of individual atoms. It is illuminating to follow out the radioactive transformations that take place in the uranium series. The disintegration of the original parent uranium is a very slow process, the half-life being 4.5×10^9 years, and it takes place by α -emission, to form Uranium X₁. This atom has a half-life of 24.1 days and emits a β -particle, to form Uranium X₂. After three more stages the product nucleus is radium (q.v.), which has a half-life of 1620 years forming radon, or radium emanation, a chemically inert gas which is α -active with a half-life of 3.82 days. After eight more stages Radium G is formed, which is stable, i.e. does not disintegrate. It is an isotope (q.v.) of lead. Rutherford found that 1 gm. of radium suffered 3.7×10^{10} disintegrations per sec. and this observation led to a definition of the Curie (q.v.) as the unit of it.

The importance of the study of R. cannot be overestimated. It led to the formulation by Rutherford of the nuclear theory of the atom, and it has resulted in the discovery of the nature of atomic nuclei. Radioactive substances provide evidence of their own nuclear structure by their disintegration, but the commoner elements are more stable, and their nuclei can be broken up only by bombarding

them with high-speed charged atomic particles or by neutrons. A close study of the tracks made by α -particles passing through gases has revealed the information that these fast-moving 'bullets' rarely collide with any material part of the gaseous atoms. Only about 1 α -particle out of 10,000 makes a direct hit on a nucleus of such gaseous atoms. The only possible conclusion from such evidence is that an atom is very largely empty space. The central nucleus ($c. 10^{-13}$ cm. diameter) with its positive charge is separated by relatively enormous distances ($c. 10^{-8}$ cm.) from its orbital electrons. Researches initiated by Rutherford (1917) and C. T. R. Wilson and carried on by Blackett concentrated on the results of these direct hits so rarely registered by an α -particle on an atomic nucleus. They found that in such cases the nuclei can be broken up by the collision to form different chemical elements.

In recent years it has become possible to produce streams of atomic nuclei travelling at speeds much higher than those of naturally occurring α -particles, and these projectiles can be used to produce, by collision with other atoms, transmutations similar to those due to collisions of α -particles. Moreover, since many times more projectiles can be provided, it is possible to produce the transmuted atoms in quantities that, if small, are nevertheless sufficient to be put to use. Much larger quantities of transmuted atoms can be obtained by bombarding materials by streams of neutrons, i.e. particles whose mass is similar to that of the hydrogen atom, but which, since they bear no electric charge, are capable of penetrating readily into the charged nuclei of atoms. The products of such changes are sometimes merely atoms of the same kinds as have long been familiar to scientists, but frequently atoms are produced which, while chemically similar to those normally found in nature, are yet unstable, and so radioactive. In this way it is possible to produce, for example, radioactive sodium and phosphorus and other elements that are found in the living body. Extremely minute quantities of radioactive materials can be detected by suitable electrical apparatus (see GEIGER COUNTER), and by introducing small quantities of such materials as radioactive phosphorus into food it is possible to follow the course of the chemical changes undergone by the same element in the living body. The potentialities of such experiments are immense, and are likely to lead to an enormous increase in our knowledge of biological processes.

See also ATOM AND ATOMIC THEORY; ELECTRON; PROTON; NUCLEUS; RADIUM; TRANSMUTATION OF THE ELEMENTS; CURIE; TRANSURANIC ELEMENTS; PHYSICAL CONSTANTS.

The classic work on the subject is *Radiations from Radioactive Substances*, 1930, by E. R. Rutherford, J. Chadwick, and C. D. Ellis. See also M. Curie, *Traité de radioactivité*, 1910; J. Chadwick, *Radioactivity and Radioactive Substances*,

1928; J. M. Cork, *Radioactivity and Nuclear Physics*, 1946; S. Glasstone, *Sourcebook on Atomic Energy*, 1952.

Radiocommunication, telecommunication by electromagnetic waves (q.v.) travelling through space. In 1864 Clerk Maxwell predicted the possibility of generating waves radiating into space from an oscillatory electric circuit, and in his *Theory of Electricity and Magnetism*, 1873, he estab. the identity of electromagnetic and light-waves travelling at 3×10^{10} cm./sec. in empty space. In 1884 Poynting gave quantitative mathematical expression to the radiation, the 'Poynting Radiation Vector' being the vector product of the electric and the magnetic vector, at right angles to the plane of the two (see VECTORS). In 1888 Hertz succeeded in the experimental demonstration of waves produced by a capacitor discharge through a coil and spark gap: the waves produced a spark in an independent gap some distance away. At the time, Oliver Lodge was working on lightning arrestors and radiation, subjects that led him in the same direction, and, following up the oscillation experiment, he succeeded in sending radio-telegraph signals over a few miles' distance, using the coherer (q.v.) as detector. Marconi now took up the problem, invented a magnetic detector and finally estab. 'wireless telegraphy' between England and France (1899) and across the Atlantic (1901). Further developments depended on, and followed rapidly, inventions and improvements of transmitting and receiving apparatus and investigations of atmospheric conditions affecting the propagation of radio waves (q.v.). Although any oscillating electric circuit emits waves, the radiation is highly inefficient unless the geometric dimensions of the circuit are of the order of magnitude of the wave-length. The wave-length corresponding to the power frequency of 50 c/s is $300,000/50 = 6000$ km., and to obtain waves of appreciable intensity with circuits (aerials) of reasonable size, high-frequency oscillations are needed. The earlier generators were high-frequency alternators or combinations of oscillatory circuits (q.v.) with an arc, producing a continuous train of waves, or with a spark generating intermittent pulses. These systems are suitable for telegraphy by Morse code, the continuous wave train being split up into sections by keying, and the rhythm of spark pulses controlled in a similar way. Both were used for ship-shore communication. About 1900, W. O. Richardson was investigating the emission of electrons from hot bodies and estab. the relation of the number of electrons emitted from a heated filament in vacuum to the temp. of the filament (see THERMIONICS). This led to the invention by Fleming (1904) of the first thermionic valve (diode), to which Lee de Forest added the 'grid' (1907) (see VALVES). As the potentialities of the valve as rectifier, detector, amplifier, and oscillation generator were realised, the

valve replaced all the earlier apparatus, new types were developed for specific purposes, and at present the valve is of universal use in its different forms in transmitters (q.v.) and receivers (q.v.). Transmission of sound became possible by modulation (q.v.). Sound waves are translated into alternating currents in the microphone (q.v.), and the output is superposed on the continuous 'carrier wave,' producing a wave train of irregular shape or irregular frequency. This is passed to the aerial and radiated into space. Impinging on any aerial tuned to the correct frequency, the induced oscillations pass to the receiver, where the carrier wave is filtered off and the remainder translated back into sound in the loudspeaker (q.v.). Developments in transmitter and receiver design have greatly improved the quality of 'signals' transmitted and have made possible the use of a range of frequencies from 10 kc/s to 30,000 Mc/s, corresponding to wavelengths of 30 km. to 1 cm. The different wavelengths have different propagation characteristics and are used for different purposes. The longer waves need larger transmitters, carry more power, and signals are of higher quality. Short waves are more easily directive, transmitters are smaller and more efficient, but the quality is less good. The shortest waves are used in radar, aircraft communication, and short-distance transmission. The waves travel in almost straight lines from a directive aerial. Waves of 10-100 metres (30-3 Mc/s) are used for long-distance communication. Waves of 1-2 km. are used in point-to-point communication between fixed stations, as the England-America telephone. Special stations for time signals, meteorological data, police radio use medium to high frequencies. In broadcasting (q.v.), high quality is essential, and wavelengths of 1.5-15 km. (2000-200 kc/s) are used. Apart from broadcasting and the many other uses of R., as aids to navigation of ships and aircraft, the development has stimulated invention of apparatus that has found further applications in other branches of science. High-frequency generators are used in dielectric heating (q.v.), localised heat treatment of metals (see FURNACES), in electrotherapy (q.v.); amplifiers and rectifiers are used in various instruments, and regulation and control apparatus; and the investigation of the ionosphere (q.v.) has yielded information of great value in geophysics.

See BLIND LANDING; DIRECTION-FINDING; RADAR; RADIO ALTIMETERS; RADIO BEACONS; RADIO RANGE; TELEVISION; BROADCASTING; ELECTROMAGNETIC WAVES.

See A. S. Ranshaw, *Radio, Television, and Radar*, 1948; M. Shurzberg and W. Osterheld, *Essentials of Radio*, 1948; R. W. Hallows, *Wireless Simply explained*, 1949; M. Gorham, *Television*, 1949; and H. E. Penrose and others, *Outlines of Radio*, 1949.

Radiogram, see GRAMOPHONE.

Radiography, see RADIOLOGY; VACUUM TUBES; X-RAYS; also MASS RADIOGRAPHY.

Radiolaria, order of rhizopod Protozoa, with numerous long and slender pseudopods which issue from the body mass in a radial direction. They are related to the Foraminifera, from which they differ by forming their skeletons of silica and acanthin. A central capsule contains the inner part of the protoplasm, which communicates with the outer part through pores. The skeleton in some species is merely a series of needles embedded in the protoplasm, but in others is connected to form beautiful designs. Existing forms mostly live far from land in the tropical oceans, and as they die their shells collect in vast deposits of radiolarial ooze, which, when cemented into rock, forms beds of chert. They have been found alive at greater depths than 500 fathoms.

Radiolocalion, see RADAR.

Radiology, in its widest sense, is the science of emanations, but the term is usually restricted to the science concerned with the production and use of X-rays (q.v.). During his investigation of cathode rays Röntgen (1895) discovered certain rays able to penetrate glass and metal, to act on photographic plates, and to cause certain salts to fluoresce. These rays, named X-rays, have proved invaluable to doctors and surgeons in aiding them to diagnose, from radiographs of the affected parts, many internal affections. The essential part of the X-ray apparatus is the focus tube, and many forms of this are in use. The tube, made of glass, tungsten, or molybdenum, is fitted with one or more anodes inclined at an angle of 45° to the axis of the tube. Electrons are emitted from a heated tungsten filament and, after being accelerated to a high speed, fall on the anode, where they produce X-rays. These diverge and pass out through the glass. A radiograph showing the bones may be obtained by interposing a hand or other bony part of the body between the tube and a sensitised plate. Considerable danger, often resulting in loss of life, attended the use of these rays during the first 30 years after their discovery. Owing to the adoption of recommendations of the Brit. X-ray and Radium Protection Committee, radiologists may now safely pursue the science. Great advances have been made in the use of these rays by the medical and dental professions. Radiological diagnosis, not only of diseases and deformities of bone, but of certain affections of the circulatory, respiratory, digestive, and urino-genital systems may now be made after appropriate impregnation of the cavities or tissues with substances rendering them opaque, and so making it possible to obtain radiographs of them. See also MASS RADIOGRAPHY. See J. W. McLaren (ed.), *Modern Trends in Diagnostic Radiology*.

Radiometer, instrument devised by Sir W. Crookes, 1873-6, consisting of 4 very thin disks of glass, mica, or metal carried on aluminium arms at right angles

to each other, and pivoted so as to rotate with as little friction as possible in a glass globe partly exhausted. The disks are coated with lampblack on one side so that on rotation bright and black surfaces succeed each other alternately. On exposure to a source of light or heat the black surfaces absorb heat in greater quantity, and their temp. is raised; the molecules of air coming in contact rebound with greater energy, and the greater reaction between the molecules and the black surfaces causes the disks to rotate, their black surfaces receding from the source of radiant energy. The speed of rotation increases with exhaustion up to a maximum, slackens, and finally stops with further exhaustion.

Radiomicrometer (electricity), combination of thermocouple and galvanometer, devised by d'Arsonval and C. V. Boys, and used for detecting and measuring feeble radiation, such as that received from heavenly bodies.

Radish, or *Raphanus sativus*, cruciferous annual plant, the root of which is a valuable salad plant; it has been cultivated from a remote period.

Radium (Ra, atomic weight 226.05, atomic number 88), element discovered by Mme Curie in 1898 when working with her husband on the radioactivity (q.v.) of uranium compounds. By testing the group precipitates of a complete analysis of pitchblende, an impure oxide of uranium, she found that the barium sulphate precipitate contained the active constituent and separated it by fractional crystallisation. She obtained radium chloride practically free from the barium salt. R. is similar in its properties (apart from its radioactivity) to the alkaline earths, calcium, strontium, and barium. The most profitable source of the element is pitchblende, and this is discovered in large quantities in Czechoslovakia at Joachimsthal. About 6 tons of pitchblende produce 1 gramme of R., and therefore R. is extremely expensive. Other sources of R. that are profitably worked in U.S.A. are the Carnotite mines in Colorado and the Autunite mines. The metal itself may be obtained by electrolytic separation from R. chloride. It is white, resembling metallic barium, and melting at 700°C. It is rapidly attacked on exposure to air, and it is generally sold in the form of R. chloride or bromide, both white salts. The 'half-life' of R. is about 1620 years, but the decay per annum is only about 0.04 per cent. The immediate product of its disintegration is radon, a chemically inert gas, which also disintegrates by the expulsion of an α -particle. The rate of its disintegration cannot be controlled by any chemical or physical agency apart from bombarding the nucleus with neutrons or charged atomic particles which can cause artificial disintegration (see RADIOACTIVITY). One gramme of R. emits 3.7×10^{10} α -particles per sec. and it generates 140 calories per hr.

The R. Institute in London was founded by Sir E. Cassel and Lord Iveagh, and the

present supplies are sufficient for treatment in all large tns. See also RADIOACTIVITY; RADON; URANIUM; X-RAYS.

Radiotherapy is the treatment of disease by means of X-rays and radioactive substances, e.g. radium. The gamma-rays from radium, which are those used therapeutically, consist of electromagnetic waves (q.v.) which are of the same essential nature as the 'hard' or 'deep' X-rays (i.e. those of very short wavelength); radium and X-ray treatment are indeed to a certain extent interchangeable, and the same unit of dosage (the Röntgen) is used for both. In addition to X-rays, radio waves have also been used, e.g. diathermic therapy, which aims at heating the body, and athermic therapy using short waves and weak currents. The use of the latter is controversial. The chief use of radiotherapy is for malignant disease, i.e. cancer, but it is also used for skin diseases, e.g. ringworm. The different types of cancer (q.v.) vary in their susceptibility to radiotherapy, and, moreover, those which are highly susceptible may recur. Good results are obtained with cancers which are slow growing and moderately radio-sensitive, e.g. those of the face, lip, mouth, breast, bladder, and uterus. Surgery remains the best form of treatment in cancers of the stomach, intestine, and rectum; surgery and radiotherapy are frequently used in combination.

A radioactive isotope of iodine (I_{131}) undergoes absorption by the thyroid gland in the same way as ordinary iodine (I_{127}), and is now being used not only for investigating the function of this gland but also for the treatment of malignant growths in it. See R. Paterson, *The Treatment of Malignant Disease by Radium and X-Rays*, 1948, and J. Walter and H. Miller, *A Short Textbook of Radiotherapy*, 1950.

Radius, see CIRCLE.

Radius, in anatomy, is the smaller companion bone to the ulna in the fore-arm. Its larger end is attached to the wrist, the smaller to the elbow. The biceps muscle is attached to it just below the crook of the arm. Colles's fracture occurs at the wrist end, some $\frac{1}{2}$ in. from the articulation.

Radius of Curvature. A point P on a curve, together with 2 neighbouring points on the curve, Q and R, determine a circle passing through these 3 points. If, as Q and R tend towards P along the curve, the circle tends to a limit, this limiting circle is known as the circle of curvature at P. The radius of this circle is the radius of curvature at P, and its reciprocal, the curvature at P. For a given curve $y(x)$ the value of the radius of curvature, denoted by ρ , is given by

$$\rho = \frac{(1 + (\frac{dy}{dx})^2)^{3/2}}{d^2y/dx^2}$$

evaluated at the point (x, y).

Radius of Gyration. If a body of mass M has a moment of inertia (q.v.) I about

an axis, then the length k defined by $I = Mk^2$ is known as the radius of gyration. Thus, if the whole mass of the body is concentrated at a point distance k from the axis, the moment of inertia is unchanged. See MOMENTS.

Radius Vector, in astronomy, the line drawn from the controlling body at the focus to a planet or satellite, etc., in any position in its orbit. The motion in the orbit is such that the R. V. sweeps out equal areas in equal times.

Radlett, residential tn of Herts, England, part of Watford rural dist., 4 m. N.E. of Watford, and lying on the Rom. Watling Street. Aldenham church is 15th cent.; the public school for boys was founded in 1597. Pop. 6500.

Radley, vil. of Berkshire, England, 2½ m. N.E. of Abingdon. Here is Radley College (q.v.). Pop. 1088.

Radley College, public school for boys, founded in 1847 by the Rev. William Sewell on Church of England principles. Buildings taking 430 boys stand in a 700-ac. park.

Radnor, Earl of, title borne by the family of Robartes from 1679 to 1757, and subsequently by that of Pleydell-Bouverie. Wm Bouverie, a wealthy Huguenot, second Viscount Folkestone (1725-76), created Baron Longford in 1747, was created Earl of R. in 1765. His son Jacob assumed the name of Pleydell-Bouverie, and his descendants still hold the title. The chief seat is Longford Castle, near Salisbury. The eldest son of the earl is called Viscount Folkestone.

Radnorshire (*Sir Paeysfed*), co. of S. Wales, bounded N. by Montgomery and Shropshire, S. by Brecknock, E. by Hereford, W. by Cardigan. Over one-half of the co. is 1000 ft or more above sea-level, the highest point 2166 ft on Radnor Forest. The prin. rivs. are the Wye and its tribs., and the Teme, all excellent for trout, and the Wye for salmon. The only important industries are agriculture, forestry, and quarrying; sheep-raising predominates. Presteigne (1250) is the co. tn, where the assizes have been held since 1542. Llandrindod Wells (3275), a noted spa, and entirely modern tn, has been the administrative centre since 1889. Knighton and Rhayader are important market tns. Near the latter are the Elan valley and Claerwen reservoirs of the Birmingham Corporation (a miniature lake dist.). R. with Brecknock returns 1 member to Parliament. Welsh, which was the prevailing language up to about 1750, is now practically extinct. Area 470 sq. m. Pop. 20,000. See W. H. Howse, *Radnorshire*, 1949.

Radon, Niton, or Radium Emanation, unstable radioactive gaseous element, symbol Rn, atomic number 86, atomic weight 222. It is a colourless gas, boiling at about -62°C., and rapidly disintegrates into helium and a radioactive solid (radium D). R. is used in radiotherapy, and is obtained by dissolving a radium salt in water. R. is spontaneously evolved by radium.

Radulescu, see ELIADE-RADULESCU.

Raeburn, Sir Henry (1756-1823), portrait painter, b. Stockbridge, Edinburgh, and at an early age began to paint. Reynolds saw great promise in his work, and persuaded him to study in Italy. R. settled in 1787 at Edinburgh, and soon acquired fame. All the Scottish notabilities of the day, except Burns, sat to him. In 1814 he sent a picture to the Royal Academy, and was immediately elected an associate, and in the following year a member. His work earned for him the title of 'the Scottish Reynolds.' See lives by W. E. Henley, 1890; his great-grandson, Wm Raeburn Andrew, 1894; Sir W. Armstrong, 1901; and E. R. Diddin, 1925. See also the essay in R. L. Stevenson's *Virginibus Puerisque*.

Raeder, Erich (1876-), Ger. adm. He joined the Navy in 1894, and was chief of staff in the First World War. He took part in the battles of the Dogger Bank and Jutland, and in bombardments of the British coastal tns. He was made adm. in 1928, grand adm. in 1939, commander-in-chief of the Ger. Navy 1935-43, being superseded by Doenitz (q.v.), inspector of war fleet from Jan. 1943, but was virtually in retirement after 1943. In the 15 years during which he commanded it he built up and directed the Ger. Navy. At the Nuremberg trial he was sentenced (1946) to imprisonment for life. He was released in 1955.

Raetia, or **Rhaetia**, former prov. of the Rom. Empire, lying in the S. Central Alps, now occupied by the canton of Grisons, Switzerland, and part of the Tyrol. It was subdued by Tiberius and Drusus (15 BC). The chief tns were Tridentum (Trent) and Curia (Coire or Chur); Augusta Vindellorum (Augsburg) was in the N. part, Vindelicla.

R.A.F., **R.A.F. Regiment**, **R.A.F. Volunteer Reserve**, see AIR FORCE.

Raffaello Sanzio, see RAPHAEL SANTI.

Raffia, or **Raphia**, genus of tropical palms with large pinnatisect leaves and huge fruit spikes sometimes 200 lb. in weight. *R. ruffia* is the Raffia or Roffia Palm, but *R. pedunculata* yields the tying material used by gardeners. *R. vinifera* (the bamboo palm) yields wine. *R. taedigera* (the Japoti palm of the Amazon) is a magnificent species.

Raffles, Sir (Thomas) Stamford (1781-1826), administrator, founder of Singapore; b. at sea off Port Morant, Jamaica. He was educated in London, and became clerk in the secretary's office of the E. India Company, in 1807 being appointed assistant secretary at the presidency of Penang. In 1810 he went to Calcutta, where he remained 4 months, and persuaded Lord Minto that the conquest of Java from the Fr. was a necessity. In 1811 an expedition for this purpose was sent out, and on the conquest of the is. being completed, R. was made lieutenant-governor, remaining there until 1816, and ruling with conspicuous success. The following year he pub. his *History of Java*. From 1818 to 1823 he was lieutenant-governor of Sumatra, the E. India Company acquiring Singapore on his

advice in 1819. See lives by H. Egerton, 1899; R. Coupland (new ed.), 1946; and Emily Hahn, *Raffles of Singapore*, 1948.

Rafflesia, genus of 6 species of stemless plants, family Rafflesiaceae, chiefly Malayan, and parasitic on the roots of species of *Cissus*. *R. arnoldiana*, the finest species, carries the largest flowers known, often more than 18 in. across.

Rafsenjan, dist. and tn of the Kerman prov. of Persia. It is the centre of a pistachio-growing area. The tn was formerly called Bahramabad. Pop. of tn and dist. 61,000; of tn 9000.

Ragged Schools, institutions first begun by John Pounds, a Portsmouth shoemaker, in 1820, which supplied free education, and sometimes bodily necessities, for destitute children. Some regard Robert Raikes, who estab. the first Sunday school at Gloucester in 1780, as the pioneer of the R. S. movement in England. In Scotland Dr Guthrie took steps in the same direction in the middle of the last century. After the foundation of the Ragged School Union in 1844 by Lord Ashley (subsequently the Earl of Shaftesbury), agencies for the education of the poor, especially children, became a permanent element in Eng. social life, but with the introduction of free compulsory education in 1870 the work of the R. S. lost its importance.

'Raghuvamsa' (Sanskrit family of Raghu), epic poem by Kalidasa, describing the hist. of Raghu and his forefathers and descendants. It dates from about the 4th cent. AD, and has been ed. repeatedly. See Eng. trans. by P. de L. Johnston, 1902.

Raglan, Lord Fitzroy James Henry Somerset, first Baron (1788-1855), soldier, the youngest son of the fifth duke of Somerset, *b.* Badminton, entered the Army in 1804, 4 years later went to Portugal as aide-de-camp to Wellington, with whom he was officially connected for sev. years. He was wounded at Waterloo, and had his right arm amputated. He was military secretary at the Horse Guards from 1827 until 1852, when he became master-general of the ordnance, and was raised to the peerage. He went to the E. in 1854 to command the Brit. troops sent against Russia in the Crimean War. He d. of dysentery before Sebastopol.

Ragnarök, the Norse doomsday after which Alfadur (the All-Father) is to create a new heaven and earth where toil, pain, misery, and sin are unknown. See GÖTTERDÄMMERUNG; MYTHOLOGY, Teutonic.

Ragstone, see KENTISH RAG.

Ragtime, form of popular music-hall song, in which both the air and words were 'ragged' or syncopeated, i.e. broken in rhythm and with accent displaced, the accompaniment being in normal rhythm. R. probably originated from Negro folk-music, and preceded the later development of jazz (q.v.) and swing.

Ragusa, Duke of, see MARMONT.

Ragusa, tn in Yugoslavia, see DUBROVNIK.

Ragusa: 1. Prov. of Italy, in SE. Sicily (q.v.). It is generally mountainous, but has a wide coastal strip in the S. and SW. The chief riv. is the Irmínio. The prin. tns include R. and Vittoria (qq.v.). Area 590 sq. m. Pop. 248,000.

2. Tn in Sicily, cap. of the prov. of R., 110 m. SE. of Palermo (q.v.). It consists of an upper (R.) and a lower (R. l'la) tn, and has fine baroque and medieval palaces and churches, including a cathedral. It forms an archbishopric with Syracuse (q.v.). It is believed to occupy the site of *Hybla Heraclea* (q.v.). It has asphalt works, and oil has been discovered in the dist. Pop. 48,000.

Ragwort. The common R. (*Senecio jacobaea*) is an abundant weed in waste places, bearing a corymb of bright yellow flower heads and pinnatifid leaves. There are also Marsh R. (*S. aquaticus*); Hoary R. (*S. erucifolius*); and Oxford R. (*S. squalidus*), an ann. form.

Rahbek, Knud Lyne (1760-1830), Dan. poet and author, *b.* Copenhagen, and educ. at the univ. there, being appointed prof. of aesthetics in 1790. Soon the literary life of Copenhagen centred round him and his wife. He ed. the *Minerva*, a critical review, begun in 1785, and the *Danish Spectator*, and as a critic exercised an important influence on Dan. literature. Amongst his own works may be mentioned *Om Shuepiller kunsten*, 1809; *Holberg som Lystspilidgter*, 1815-17; and numerous eds. of Scandinavian poets, particularly Holberg, Samsøe, and P. A. Heiberg; in collaboration with Nyerup he wrote *Bidrag til den danske Litteraturs Historie*, 1800-8.

Rahel, Antonie Friederike Levin (*b.* 1771), wife of Varnhagen von Ense (q.v.).

Rahere, see BARTHOLOMEW'S (St) HOSPITAL.

Rahman Putra, Turku Abdul, see MALAYA.

Rahway, tn of Union co., New Jersey, U.S.A., 20 m. SW. of New York. It manufs. chemicals, pharmaceuticals, lubricating oil, cereals, dehydrated foods, metal products, books, rubber goods, furniture, and vacuum cleaners; there are truck farms nearby. Pop. 21,290.

Rai (anc. Rhagae, Rhages), dist. and tn in Persia, 6 m. S. of Tehran. In the early Middle Ages R. was an important city. It was sacked in 1220 by the Mongols. Its place as the most important city of the area was then taken by Varamin and subsequently Tehran. The modern name for R. is Shah Abd ul-Azim, which it is called after a son of Ali ar-Riza, the eighth Imam, and whose tomb there is a place of pilgrimage for Muslims of the Shi'ite sect. Pop. (of tn) c. 12,000.

Raiatea, second largest is. in the Society Group, about 30 m. in circumference. Its highest point is Mt Temehani, 3389 ft. The is. was of old a Maori seat of learning and a holy place; from here over 600 years ago the first canoe set sail on the voyage to New Zealand. The ceremony of fire-walking is still occasionally carried out. General characteristics and products similar to Tahiti (q.v.).

Raibolini, Francesco, see **FRANCIA**.

Raidjua, or Rajjua, see **SAVU**.

Raiffeisen, Friedrich Wilhelm (1818-88), Ger. economist, b. Hamm; entered the Army and left it for the civil service. In 1845 he was made burgomaster of Weyerbusch, in 1848 of Flammerfeld, and in 1852 of Heddendorf. He was obliged to retire in 1865 owing to ill health. He did much good work in improving the social conditions of the labouring classes, and in planning roads; but is specially remembered as the founder of agric. co-operative loan banks (*Darlehenskassenvereine*). His system received gov. support in Germany, and spread to other European countries. In 1878 he founded at Neuwied the periodical *Das landwirtschaftliche Genossenschaftsblatt*. See also **CO-OPERATION**.

Rajjua, see **SAVU**.

Raikes, Robert (1735-1811), philanthropist, b. Gloucester, and in 1757 succeeded his father as printer and proprietor of the *Gloucester Journal*. He continued this work till 1802. He had early been active in the agitation for prison reform, and in 1780 started a Sunday school at Gloucester, which developed into a national movement. A statue of him stands on the Thames Embankment. See A. Gregory, *Robert Raikes: Journalist and Philanthropist*, 1877, and a study by G. Kendall, 1939.

Rail, name for the members of the *Rallidae*, a family of birds with a long bill curved at the tip. The Brit. representatives include the land-R. or corn crane, coot, moor-hen or water-hen, and the water-R. (*Rallus aquaticus*). The last mentioned is typical of the family.

Railcars combine the engine, passenger, and goods compartments on a single chassis, and are the most economical means of satisfying modern demands for frequent service. On electric traction systems a railcar is technically like a tramcar (see **TRAMWAYS**). Steam R. are now mostly replaced by Diesel-electric cars, which need no boiler, and are easily refuelled and thermally efficient. The engine may have 3-12 cylinders developing 120-300 h.p. at 1000-2000 revolutions per min., and drives a d.c. generator supplying the series traction motors. See B. Reed, *Diesel Locomotives and Railcars*, 1935.

Railton, Herbert (1857-1910), illustrator and etcher, b. Pleasington, Lancs, and educated at Mechlin and at Ampleforth College, Yorks. He contributed architectural and other drawings to the *Illustrated Press*, and was well known as a delicate black-and-white artist. He illustrated a work on Westminster Abbey; a jubilee ed. of *Pickwick*; C. W. Stubbs's *Cambridge and its Story*, 1903, and C. Headlam's *Oxford and its Story*, 1904 (both in the Medieval Towns series); and, in collaboration with H. Thomson, W. O. Tristram's *Coaching Days and Coaching Ways*, 1888.

Railwaymen, National Union of (N.U.R.), one of the prin. railway trade unions in the U.K., the others being the **Associated Society of Locomotive En-**

gineers and Firemen (q.v.) and the **Transport Salaried Staffs' Association** (q.v.). The N.U.R. became organised as one of the strongest unions in the country during the first decade of the present cent., being greatly influenced by syndicalist views (see **SYNDICALISM**) as interpreted by Tom Mann, who subordinated the peculiarly Fr. ideal of a collectivist state, then much discussed, to the more practical policy of founding political influence on industrial power. Rates of wages, hours, and conditions of work are regulated by national agreements between the British Transport Commission and the N.U.R. Disputes with the N.U.R. and other railway unions are subject to arbitration by the Railway Staff National Tribunal, composed of 3 independent persons outside the transport authority.

Railways. HISTORICAL. British Railways. The first railway or 'tram' is said to have been laid down at a Newcastle colliery during the reign of Charles I, and consisted simply of wooden planks laid on the ground. The construction was improved from time to time by laying a second line of planks or an iron plate, renewable when worn, on top of the 'sleepers' and by using iron wheels on the wagons, and in this form R. became widely used in the 18th cent. for the carriage of coal from collieries to the nearest waterways. Flanged wheels on cast-iron-edged rails were first tried in 1789. With the growth of mining and metallurgical industries after 1790 the use of railway transport became more common, and in 1811 S. Wales had a network of lines, some extending up to 21 m., totalling 150 m., while Tyne-side and the Ironbridge area were also well provided. In 1801 the Surrey iron railway was built from Wandsworth to Croydon, partly as a public way, partly for the carriage of general goods; with its double track and double horseway it had a width of 24 ft. In 1810-16 came the Gloucester-Cheltenham line, and about the same time the line from the Brecon and Abergavenny canal to Hay, which ran through the first railway tunnel. All these early R. were short local lines, often privately owned, intended for the carriage of heavy goods, mainly coal, to relieve the roads of heavy traffic, and as an adjunct to the canal system. Speed was not a consideration, and wagons, of no special design, were horse-drawn. The sight of a horse pulling a wagon on smooth rails was so like the familiar one of a horse pulling a boat on a canal that the term navigation was used to cover both forms of transport. Later skilled workers on railway-line construction became known as navigators, 'navvies' for short. Wrought-iron bars were tried as rails in 1805, but cast-iron remained in favour, especially in the dumb-bell shape, until John Birkinshaw of Bedlington patented a method for rolling wrought iron in that shape (1820). Being adopted by the Liverpool and Manchester Railways these rails became generally used, and the modern design is

based on them, though steel was used from the seventies.

Meanwhile Trevithick was experimenting with locomotives on the Cardiff-Merthyr line (1804). Blenkinsop constructed a rack-and-pinion engine which ran on a line near Leeds (1811), Blckett was busy at Wylam (1813), and George Stephenson at Killingworth (1815), and stationary engines pulling wagons by cable were tried; but in spite of Thomas Gray's vigorous plea in his *Observations on a General Iron Railway or Land Steam Conveyance*, 1821, the 'present pitiful methods' of horse traction were still seriously considered when the Newcastle-Carlisle line was nearing completion (1834). However, in 1825 the Stockton and Darlington line was opened, worked by Stephenson's locomotive, and in 1827 the directors reported favourably. When the Liverpool and Manchester line was nearly complete discussion on locomotive versus stationary engines led to the famous Rainhill competition (Oct. 1829), won by Stephenson's 'Rocket' (q.v.). In 1834 a previous Act prohibiting the use of locomotives on the Newcastle-Carlisle line was rescinded and the victory of the locomotive was complete.

In 1830 the Whitstable-Canterbury ('oyster') line was opened and worked by Stephenson's 'Invicta,' and in 1833 came the Leicester-Swannington, the germ of the Midland system. There followed a feverish projecting of lines and promotion of companies; 54 railway Acts were passed in 1825-35 covering 500 m., and 39 Acts in 1836-7 added 1000 m., and while the former included the London-Birmingham-Preston (112 m., opened 1838) and the Grand Junction, and the latter the Manchester-Leeds with its 11-m. tunnel, the G.W., and lines from London to Southampton, Portsmouth, Dover, Brighton, Colchester, Cambridge, and York, many projects were still-born and the activity subsided in 1841.

In 1844 a new period begins with the emergence of the railway 'kings,' George Hudson, Carr Glyn, and Mark Huish, who started the amalgamation of lines into dist. systems such as the Midland, the L.N.W.R., the Lancashire and Yorkshire, the S.W., etc. The York, Newcastle, and Berwick line was built with the Newcastle high-level and the Royal Border bridges, and, through amalgamation with the Yorkshire and North Midland and the acquisition of the Newcastle-Carlisle and the Stockton and Darlington (1863), became the first complete dist. monopoly, the North-Eastern Railway, controlling all the lines between the border and the Humber, the Pennines, and the North Sea. Linking up with the King's Cross to York line (opened 1850), the E. coast route to Scotland was complete. By 1870 the mileage had increased to 13,600, by 1885 to 16,700; amalgamation and leasing of lines between the various companies was estab., and all the main lines of the modern system were operating; later additions were mostly branch lines, except the Manchester, Sheffield, and Lincoln-

shire Railway, later named the Great Central; the last London terminus (Marylebone) was completed in 1899. Under the Railways Act, 1921, the R. of Britain were grouped into 4 systems: L.M.S. (6840 m.); L.N.E.R. (6380 m.); G.W.R. (3793 m.); S.R. (2185 m.); total 19,298 m. of route.

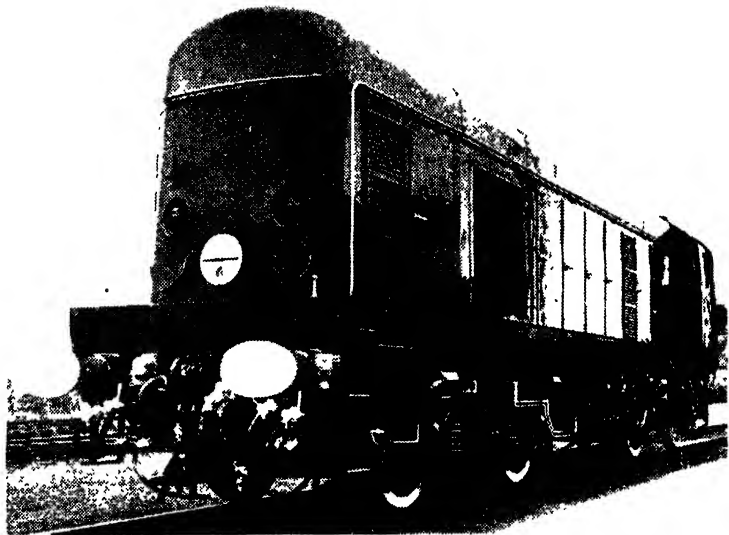
On the outbreak of the Second World War emergency legislation placed the R. under control of the minister of war transport, their finances being regulated under the Railway Control Agreement. This arrangement continued until, under the Transport Act, 1947, responsibility for the administration, maintenance, and operation of British Railways, together with certain ancillary services, passed on 1 Jan. 1948 to the Railway Executive, which acted as agents of the Brit. Transport Commission, in accordance with a scheme of delegation made by the commission, and approved by the minister of transport. The Railway Executive had the status of a public authority and dealt with the public, was the employer of the staff, and the body which entered into contracts and sued, or was sued, in the courts of law. The members of the Railway Executive were appointed by the minister of transport after consultation with the commission (see Brit. Transport Commission, *Report and Accounts for 1948*, H.M.S.O., 1949). By the Transport Act of 1953 the Railway Executive was abolished, and since 1 Oct. 1953 British Railways have been under the direct control of the commission. The detailed supervision, operation, and maintenance of this, the most important unified railway system in the world, is vested in departmental officers in 6 regions; these are the London Midland, covering (with some exceptions) the former L.M.S. in England and Wales; the W., covering the former G.W.R., with additional lines in Wales and Cornwall; the S., covering the former S.R. E. of Exeter; the E., covering the S. area of the former L.N.E.R., Doncaster and Sheffield to London; NE., covering the NE. area of the former L.N.E.R., Doncaster, Huddersfield, and Bradford to Berwick; and Scottish, covering the former L.M.S. and L.N.E.R. lines in Scotland. To implement the plan of the Labour Gov. for the nationalisation of transport, 5 other executives were organised, namely Road Haulage, Road Passenger, London Transport, Docks and Inland Waterways, and Hotels, but all except the London Transport Executive have now been abolished. The 1953 Act provides for the estab. of 6 Area Boards corresponding more or less to the 6 railway regions, and these have been appointed; their functions may eventually cover other activities of the commission within these areas.

At the end of 1955 the staff of British Railways numbered 563,000, as against 650,000 at the end of 1948. There were 18,500 locomotives (steam 17,960, electric 71, diesel, gas-turbine, and petrol 456), as against 20,300 in 1948; 41,700 carriages, with total seating and berth capacity 2,458,900; 1,124,800 wagons;

34,200 road-rail containers; and 15,700 road motor vehicles. There were 966,900,000 passenger journeys (966,000,000 in 1948), and estimated passenger miles totalled 20,308,000,000 (21,259,000,000 in 1948). In 1956 over 23,000 passenger trains were run each weekday. British Railways' catering facilities include 36 hotels, refreshment and dining-rooms at 370 stations, and 654 restaurant and cafeteria cars operating daily on trains. Cross-Channel ser-

economic. Later improvements, mainly in rolling stock, have come also from the U.S.A. and European countries, where development was not hampered by earlier track construction which limited speed and weight.

In Canada the early railway building (1850-60) was not successful owing to lack of capital and the difficulty of envisaging the future trend of development of the country, and some of the work was inferior in quality. The Confederation Act (1867)



British Railways

A 1000-H.P. DIESEL-ELECTRIC LOCOMOTIVE

Built at the English Electric Group's Works in 1957, it is in use on mixed traffic duty on London Midland Region.

vices, organised in conjunction with British Railways, carried 4,393,000 passengers in 1955, with 1,700,000 tons of cargo, 286,000 head of livestock, and 171,000 vehicles.

Foreign Railways. Up to the 1880's Brit. R. served as a model for the world, both as regards construction and organisation. Brit. engineers built railroads both in Europe and overseas, and both engines and rails were important items of export, though most European countries favoured the Vignoles flat-bottom rail spiked direct on the sleepers, the bull-head or dumb-bell type fixed in stools continuing in use in Great Britain; recently some stretches of track have been laid with flat-bottom rails, and this type has now been adopted as standard, as this design is more

provided a new stimulus, and in 1871 the project of a transcontinental line was first formed; but some lean years followed, and the financial arrangements were not completed until 1881. The Canadian Pacific line was opened in 1885, the Grand Trunk in 1903, and by 1908 there were 23,000 m. of line in operation. In 1949 the mileage was 42,336.

In Australia and New Zealand railway building began about 1870, mostly with gov. aid and under gov. control. Lines naturally ran from coast to inland. By 1871 Australia had 1030 m. of R.; by 1907 this had increased to nearly 16,000 m.; in 1949 the total was 28,471. New Zealand then had 3528 m.

The origin of European land settlement in Kenya is closely connected with the

construction of the Kenya-Uganda railway. This system consists of the main line from Mombasa to Kampala, 878 m., with a connection to Kisumu, 131 m., and a number of minor branch lines (421 m.). The Benguela Railway in Angola was completed to Dilolo in 1929; it has since been extended through Rhodesia to Beira in Mozambique, thus completing the transcontinental route.

The lines of India form an extensive system of some 42,600 m. (including Burma) of various gauges. The 3 which are most important are the broad (5 ft 6 in.), the metre, and the narrow (2 ft 6 in.). The largest R. are the Great Indian Peninsular, the East Indian, and the Madras and Southern Mahratta. The various types of Indian locomotives are standardised, being built to the specifications of the Standards Committee. There are various small lines in India which run up into the hills, with many ingenious devices for overcoming the grades, such as reversing stations and circular tunnels. The most famous is the Darjeeling line.

The tremendous importance of railway development in the U.S.A. cannot be properly appreciated without close study of the geography and of the early hist. of the settlements. At the end of the 1812-15 war activities in the E. states were mainly commercial and industrial; in the S. were the cotton states, while the middle W., separated from the E. by the mts, was just beginning to develop as grain-, timber-, and coal-producer. The W. sold to the S., the bulky goods being floated down the rvs. (Ohio, Mississippi) on flat-bottom boats which were usually sold with the cargo, as transport upstream was not feasible. The W. bought from the E., but did not sell to them, as the heavy produce could not be carried over the mt paths. R. were the only means of linking E. to W., and on the closer commercial connections followed a feeling of solidarity, rooted in common interests, of grave portent in the civil war, when the W. sided with the N. states. The first line projected was to run from Baltimore linking the coast with the Ohio valley (1831), though Ohio was not actually reached until 1853. In 1842 came the Boston-Albany line and the line from New York to Buffalo. The first locomotives were imported from the Stephenson works in England, and the iron rails were, in the main, imported from England until civil war days. It was the manuf. of rails, about this time, that gave the stimulus to the development of Klomann's forge in Pittsburgh, which was to become the Carnegie Steel Works. Railway systems were gradually expanded in the organised states of the union, with more in the N. than in the S. The civil war gave a tremendous impetus to the railroads of the N., and they played their part in winning the war by quick transportation of troops, munitions, and food. By the same token the R. of the S. deteriorated, because, with its meagre supply of iron and steel industries, the

Confederacy was not able to keep them up to standard.

The period following the civil war saw a great expansion in the railway systems of the U.S.A. On 1 July 1862, even before the war was over, President Lincoln gave his approval to an Act of Congress incorporating the Union Pacific Railroad, the first transcontinental railway in the U.S.A. This company was to receive immense land grants and \$45,000 for each mile of railway completed. The route was to be from the little tn of Omaha through Nebraska, Wyoming, and the Rockies to the Great Salt Basin in Utah. The Central Pacific had before that received a somewhat similar right to build eastwards from Sacramento, California, through the Sierra Nevada and the ter. of Nevada and on to Utah. Actual work started on both these roads simultaneously in 1864, while the war was still in progress. The labour engaged on the E. section was mostly Irish, and that on the W. Chinese, a fact which strikingly typified 'the meeting of 2 worlds on American soil.' The 2 sections were dramatically joined in May 1869, near Ogden, Utah, where, with a characteristic gesture, a golden spike was driven in to celebrate the great occasion when for the first time the Atlantic and Pacific were 'bound together by iron bands of communication.'

In the meantime 3 other great transcontinental lines received similar charters. The Northern Pacific was to run from the waters of Lake Superior across Minnesota, through the Dakotas, the Yellowstone valley, the Rocky Mts, to Portland, Oregon. The Southern Pacific was to run from New Orleans across Texas, and thence to Los Angeles and San Francisco. The Santa Fé was to run from Atchison, Kansas, through Colorado, the Rockies, and thence to Santa Fé, New Mexico, and San Diego, California. By 1884 all had reached the Pacific Ocean.

In 1865 there were 35,000 m. of R. in the U.S.A. By 1873 this had been doubled, and by 1887 had increased to 87,000 m. The like Kansas City, Cheyenne, St Paul, Portland, and Seattle were originally creations of the R. Not only had the R. enormously increased their mileage, but they had been made more effective than those in Europe by reason of many Amer. inventions and discoveries which were adapted to Amer. usage. The first locomotives had been wood-burners. They were rapidly replaced by coal-burning expansion machines capable of enormous steam pressure. They steadily increased until they reached a size unknown anywhere else in the world. This was rendered necessary by the heavy weight of the trains, the long distances they travelled, and the mountainous country through which many of them ran. In 1869 the Westinghouse air brake was invented; in 1871 came the automatic coupler; in 1874 the block-signal system; in 1875 the refrigerator car, which made possible shipment of meat, fish, fruit,

and vegetables all over the country. The Pullman sleeping-car had been invented in 1864. In 1900 all-steel passenger and freight cars began to be used. While very expensive, this was done to lessen the dangers of fire and death in case of accidents.

The 1955 statistics showed that the U.S.A. had a greater railway mileage than any other country in the world, with a total of 221,098 m. Other figures were: Argentina, 27,273; Australia, 27,062; Canada, 43,132; France, 25,223; Germany (West), 22,878; Germany (East), 9980; Great Britain, 19,470; India, 34,705; U.S.S.R., 74,753. For its area, Great Britain has the greatest mileage. In the U.S.A. there were in service, in 1954, 35,033 locomotives, 1,761,386 freight cars, and 33,035 passenger cars; passenger revenue amounted to \$767,987,000 and freight revenue to \$7,914,809,000; employees numbered 1,078,000. The mileage of the longest Amer. R. in 1956 was as follows: Atchison, Topeka, and Santa Fé System, 13,124; Southern Pacific System, 12,420; Chicago, Milwaukee, St Paul, and Pacific, 10,638; New York Central, 10,613; Pennsylvania, 10,006; Union Pacific, 9801; Missouri Pacific, 9693; Chicago, Burlington, and Quincy, 8805; Great Northern, 8285; Chicago and North Western, 7824; Chicago, Rock Island, and Pacific, 7597; Minneapolis, St Paul, and Sault Ste-Marie, 6865; Northern Pacific, 6865; Illinois Central, 6520; Southern Railway System, 6289; Baltimore and Ohio, 6020; Atlantic Coast Line, 5289; Chesapeake and Ohio, 5132; St Louis-San Francisco System, 4765; Louisville and Nashville, 4732.

The R. of Europe form a very complete and extensive system, being nearly all of the same gauge, the exceptions being those of Russia and the whole of the Iberian Peninsula. Switzerland is pre-eminent in the matter of engineering triumphs, the great tunnels under the Alps being masterpieces of construction. Electric traction plays a large part in the lines of Europe generally, many lines having been constructed in almost every country. The Compagnie Internationale des Wagons-Lits provides a service of through trains between various points on the Continent. These trains consist solely of dining- and sleeping-cars, and run as the Orient Express from Paris to Istanbul, and from Calais to Trieste and Venice, and from Calais to Rome. In S. America sev. great amalgamations were made before the First World War, whereby the systems of Argentina and the S. portions of Brazil were brought into close communication. The Andes have been tunnelled and the lines extend to the N. of Peru, while the Mexican system links up with that of Guatemala. Elsewhere some of the most important R. are the trans-Siberian (q.v.), a notable feature of which is the section that circumvents part of Lake Balkal; the Turk-Sib (q.v.); the Bagdad Railway (q.v.); the so-called Cape-to-Cairo Railway; the Hedjaz Rail-

way; and the Damascus-Mecca line. (See also the names of the different countries.)

ELECTRIC RAILWAYS. The question of railway electrification differs widely in its application to main-line and to suburban traffic, in its economical as well as in its technical aspect. Suburban service requires frequent trains throughout the day, with frequent stops, and increased seating capacity during rush-hours. Electric trains made up of train units each consisting of 1 motor coach with 1 or more trailers provide the necessary flexibility of operation, and the direct current (d.c.) series motor with its excellent accelerating characteristics, light weight, and simple (continuous) speed control is ideal for the purpose, as it enables a high schedule speed to be attained, and thus a higher train mileage can be achieved with less rolling stock than is possible with steam trains. Further, congestion at terminal stations is avoided owing to the quick turn-round, and no time is lost in fuelling. Suburban lines radiate from or connect large cities where power stations are otherwise available, and suburban traction constitutes a useful load-balancer on the power station, as the load is fairly evenly distributed through the day when the lighting load is least, and the power demand can usually be met without substantial increase in the generating capacity and, in particular, without additional reserve capacity or increase in staff. Distances are shorter and trains are lighter than in main-line services, and very high voltages, which alone make long-distance transmission of large power amounts possible, are not



English Electric Co. Ltd.
ELECTRIC LOCOMOTIVE

A 3000-h.p., 3000-volt D.C. locomotive of the Central Railway of Brazil.

required. Main-line electrification has been largely confined to countries disposing of large water-power resources and where coal is not available at prices to compete with hydro-electric generation. Electric trains are technically superior to steam trains in tunnels, owing to the absence of smoke, and on lines with steep gradients, but otherwise a choice of system can be made only after careful consideration of capital and working costs: the

former are considerably higher for electric lines, and both vary according to the locality. In countries where either steam traction or electric traction has become established it is not likely that any radical change-over would prove economically feasible at present. The question of electric generation by means of steam raised by atomic-pile heating cannot as yet be adequately discussed.

Two systems of electrification are at present in general use: direct current (d.c.) at from 600 to 3000 volts, and single-phase alternating current (a.c.) at up to 15,000 volts at low frequency, 16½ cycles (c/s) in Europe, 25 c/s in the U.S.A. The only notable large-scale exception is the It. State Railway three-phase 3600-volt system in N. Italy. For suburban lines the d.c. system is now universally employed, at 600–1200 volts, most services being operated on the motor-coach unit principle. Each motor coach has 2 or 4 motors, each of between 150 and 300 h.p., and the power per driving axle is 100–250 kW. The weight of a motor coach without passengers is between 20 and 70 tons. The adhesive weight of a train consisting of sev. units is thus distributed over a large number of axles, usually 2 or 4 per motor coach, and the total weight of the train is more uniformly distributed on the track than would be the case with a locomotive-hauled train. Current is supplied to the trains through an overhead contact wire for higher voltages, the track rails carrying the return current. For low-voltage lines the supply is usually through conductor rails supported on insulators; one rail may be placed in the middle between the track rails and the other at the side, or both at the side, and if the track rails are used for carrying the return current only 1 conductor rail is required.

In the case of overhead contact lines the current is carried to the motors through a bow or a partograph collector sliding on the under-side of the contact wire, contact being maintained by a spring attachment on the roof of the vehicle for the bow collector, while links in the partograph are joined by springs. In the case of contact rails a collector shoe slides on the rails, its weight being usually sufficient to maintain contact. In some cases the contact rails are suspended from insulators and the collector shoe slides on the under-side, being pressed against the rail by a spring. This arrangement allows of protecting the upper rail surface against contact with other objects and keeps the contact surface free from dust, rain, sleet, or falling leaves. Side-contact with a specially shaped contact rail has also been used. The contact-rail system has been used for up to 1200 volts but for voltages above 1000 the overhead system is preferable. To ensure constant height and adequate rigidity of the contact wire it is suspended (and insulated) from a steel cable by a number of closely spaced vertical hangers. The steel cable is supported (and insulated) from the masts and naturally hangs with a sag between the masts, in

the shape of a catenary. Sometimes double-catenary suspension is used.

As the power transmitted by the line is measured by the product of voltage (V) and current (I), whereas the losses due to dissipation (heat) in the wire are the product of wire resistance (R) and I^2 and the consequent drop in voltage is RI , high-voltage transmission is most economical, but a limit is set to the voltage in a d.c. system by the switchgear, which becomes unmanageable above 3000 volts, though experiments with 4000 volts have been carried out. High current values would require heavy (low-resistance) contact lines and the current collectors would become unwieldy. There is thus a limit to the power that can be supplied on the d.c. system, i.e. to the traffic that can be handled. The volt drop in the line is kept within limits by feeding the line at intermediate points by cables direct from the substations. Energy is delivered from the large generating stations or tapped from the main a.c. high-voltage network to substations suitably placed along the line, where it is converted by mercury-vapour rectifiers into d.c. The modern substations are automatic in operation and remote-controlled.

Main-line traffic involves both passengers and heavy freight, and trains are locomotive-hauled. The longer distances and the greater power required make high voltages imperative. The Fr. R. (Midi, Paris–Lyon–Méditerranée, Orléans) use 1500-volt d.c., and this system is also employed in Holland, Belgium, Spain, N. Italy, Australia, New Zealand, and India, while some American lines, notably the Chicago, Milwaukee, and St Paul, the Paulista in Brazil, the Transandinine, and the Chilean, use 3000-volt d.c. Single-phase (a.c.) is used in Norway, Sweden, Germany, Switzerland, Austria, and Italy, and in the U.S.A. The limits to the d.c. system were discussed above. They hinge on the impossibility of stepping down the high voltage required on the contact line for efficient transmission to the low voltage manageable on the locomotive. As modern electric locomotives are built for powers up to 3000 kW or more, this would require a contact wire of a carrying capacity, at 3000 volts, of 1000 amps., which involves a formidable amount of copper. On the other hand, it is possible to use the ordinary three-phase 50-c/s supply as generated for conversion into d.c. in the substations by the mercury-vapour converter. A high-voltage a.c. system with overhead supply has proved successful in France, and British Railways are adopting it for future electrification. It is cheaper to install and operate, and offers more scope for development.

The Liverpool overhead railway was opened in 1893, being electrified at the start, and was the first overhead railway in the world to be so operated. The under-riv. Mersey railway was converted from steam to electric traction in 1903, the Liverpool–Southport, 1904, and, in the Manchester suburban area, the Bury line

was electrified in 1916. The Altrincham route, electrified in 1931, was the first railway in Britain to adopt the 1500-volt overhead conductor system, as recommended by the Pringle Committee. Electrification has characteristic features which make it suitable for some kinds of traffic, e.g. the trains can be driven from either end, the number of coaches can be adjusted to traffic requirements, uniform speeds are possible, and so on, and these features make electrification particularly suitable to the operating of intensive suburban services, such as those mentioned above. The British Railways S. Region has now the largest electrified suburban system in the world, and the conversion has made possible a 70 per cent increase in services to and from London in the rush hours. Main-line routes also are now being converted, and electrification of the main line (formerly G.C.R.) from Manchester over the Pennines to Sheffield and Wath-upon-Deane was completed in 1954. Trunk routes from Euston and King's Cross have been selected for conversion, while the existing electrified systems running from Liverpool St and in the S. Region are being extended to cover more main lines. Progress is being made in widespread replacement of steam by electric and Diesel traction. The last steam engines for passenger service were built in 1956, and soon the building of all steam locomotives for Brit. R. will cease.

UNDERGROUND RAILWAYS AND TUNNELS. Under this heading is comprised not only underground city R., but also that specially difficult part of the contractor's business, viz. tunnelling. Where possible the centre line is set out on the surface under which the tunnel will run, and a series of shafts are sunk from 100 to 300 yds apart. To transfer this line underground 2 marks are made in the cross-timbers, in the centre-line, at the bottom of each shaft and prolonged in both directions when the tunnel is being opened out. In tunnels of great length, e.g. the St Gotthard, the centre line is determined by a triangulation survey. Small-section tunnels are usually driven from one end to the other at their full dimensions. With large-section tunnels a pilot heading is excavated in advance and later enlarged to the full section. Under suitable surface conditions long tunnels are generally driven from a number of 'faces' by sinking shafts along the line of the tunnel and starting working faces in both directions from each shaft bottom. In heavily watered rocks or clay a Great-head shield is sometimes used, consisting of a ring of steel which is forced forward by hydraulic rams. In difficult cases work under pressure with an air lock may be required. (See further TUNNELLING.) Famous tunnels include the Simplon, between Switzerland and Italy, 12½ m. (the longest of the 5 big Alpine tunnels); the Apennine tunnel in Italy, 11½ m.; the New Cascade tunnel through the Rocky Mts, 7½ m., the longest in America; and the Severn tunnel, England, 4½ m.

The 'tubes' of London's excellent system were all constructed with the Greathead shield, whilst the Metropolitan and the District were constructed where possible by 'cut and cover.' The prin. London 'tubes' are the Northern Line (a combination and extension of the old Hampstead and Highgate and City and S. London lines), the Piccadilly, the Bakerloo, the Central Line, and the Post Office Tube. The latter, which is a narrow-gauge tube, is automatically operated and carries only mails.

The London underground railway has 280 stations, 4000 coaches, 10,000 m. of telephone wire, and the longest tunnel in the world (17½ m.), from E. Finchley to Morden. New York has an extensive underground (subway) and tube system, while the main-line R. on Manhattan also travel in tunnels, and are electrically operated. Underground systems are also to be found in Paris, Berlin, Moscow, Madrid, Buenos Aires, Tokyo, Glasgow, and other large cities. Underground city R. in nearly all cases are worked with 'multiple unit' trains, on the 600-800-volt d.c. system. The track of the London underground railway is laid with an up-gradient at the entrance to, and a down-gradient at the exit from, the stations, to facilitate stopping and starting.

MOUNTAIN RAILWAYS. It is to Switzerland that attention must be turned to see how the railway engineer has scaled the peaks and brought his lines up to the summit of great mts like the Jungfrau. These lines would have been impossible but for the use of the rack; the one mostly used, invented by M. Abt, consists really of 2 racks placed side by side, the teeth on one corresponding to the spaces on the other. The first rack-and-pinion railway was constructed by Blenkinsop near Leeds (1811), and for some time the curious opinion prevailed that no other way of working was possible with a locomotive. The rack-and-pinion system really came into its own in 1869, in which year the Amer. engineer March built a mt-climber, the Mt Washington Railway in New Hampshire, U.S.A., on this system, and 3 years later, through the ingenuity of Riggenbach, Europe saw its first rack-and-pinion up the Righi, in Switzerland. The gradients which formed part of the problem of building this famous railway were of formidable magnitude. The rock is nearly 7000 ft high and rises 5600 ft above the valley. The slope varies, however, even the easier being 1 in 5, and the average over the 3 m. of line is 1 in 3. There is probably no railway which has ever tackled gradients steeper than 1 in 2, but mechanical transport of some kind can be provided for any inclination. Lifts negotiate the steepest rise of 1 in 0. But the funicular railway, which may be classified between the lift and the rack-and-pinion, is practically independent of the gradient. The Virgil line in the Tyrol, for instance, has a rise of 1 in 1.43.

In the early days the funicular was

almost always employed, consisting of 2 cars, one ascending and the other descending, connected by a rope passing round a pulley at the top. In this system the descending car, plus a sufficient water ballast, draws up the ascending car. For long hauls electric motors are used to assist the winding of the rope. A good example of the latter type is up Salvatore outside Lugano, of a length of 1 m., the maximum grade being 63 per cent.

In the pre-electric days a system was largely employed in which the engine pushed the car up, and the car followed the engine down. In the case of the Righi Railway the boiler is placed as usual in a locomotive, but in the Pilatus Bahn it is placed across the frames, so that the water is equal in depth at both ends. Such a line exists in Wales from Llanberis to the summit of Snowdon, and has been running for many years. It is steam operated, 4½ in. in length, with gauge 2 ft 7½ in. The only other line to the top of a mt in the Brit. Isles is the Fell line to the top of Snaefell in the Isle of Man.

The modern type of purely mt line is worked by electric traction, either continuous or a.c. being employed. Such lines are numerous, and the most modern are constructed largely in tunnel, e.g. the line up the Jungfrau, the last portion of which is almost entirely concealed from view, the stations being opened out in the form of galleries. Certain lines, too, must be classed under this heading in which for a portion of the distance racks are laid down to assist the locomotives on heavy grades; an example of this type runs over the Brenner Pass, and another occurs in New Zealand, where the grade in one place is exceedingly long and adverse. Special locomotives, of course, have to be built for these services, it being usual for the cylinders driving the wheels which engage the rack to be separate from the ordinary 'adhesion' mechanism. The Jungfrau-Joch Railway still ranks as possibly the most noteworthy feat of railway engineering in Europe, but there are mt R. in other parts of the world which are at least equal achievements; for instance, in S. America remarkable work has been accomplished in joining the great cities of the Pacific coast to the Atlantic ports. A fine example is the line connecting Valparaiso with Buenos Aires, over 1000 m. long, the first section passing over the Andes at a height of 14,000-16,000 ft. A famous cable railway for ordinary passenger traffic ascends the Wetterhorn in the Bernese Oberland. It was designed by Feldmann (the engineer who built the curious suspension railway at Wuppertal); he employed 2 carrier cables in each direction, corresponding to the rails of a railway track, but the cables lay above each other, not side by side. He thereby eliminated the swaying of the car, an objectionable feature in other systems, especially in a strong wind. Another cable railway leads to the Kohler Peak in the Tyrol. The cables are 1 m. long and the journey takes 13 min.

LIGHT RAILWAYS. In dists. where the traffic is insufficient to support a railway of main-line class, facilities are often provided by light R., especially abroad and in the colonies. In England, where there are metalled roads even in the most thinly populated dists., a service is more easily given by omnibus, and most of the light R. have been closed. An exception is the 15-in. gauge Romney, Hythe, and Dymchurch Railway, which is worked by scale model locomotives, and carries mostly holiday-makers. Outside England light R. and steam tramways are much used, since a single line of railway costs much less to construct and to maintain than a metalled road of corresponding capacity. They are often laid in undeveloped country, such as Africa, or in dists. where travel is a novelty, such as parts of India, with a view to being replaced by main-line R. as soon as the traffic has grown sufficiently. They are generally laid to a narrow gauge (metre, 3 ft, 2 ft 6 in., and 1 ft 11½ in. being usual sizes), though standard-gauge light R. are not unknown. The latter have the advantage of being easily convertible to main-line standard should the traffic warrant it, and are not much more expensive than narrow-gauge lines in first cost; the latter, however, permit more flexibility in curves.

MONO-RAILWAYS. During the first few years of the present cent. many schemes were brought forward for linking up important cities by very fast trains, including Liverpool-Manchester and London-Brighton. Electricity was to be the motive power, and in order to minimise friction some sort of single-rail design was to be devised. The Listowel and Ballybunion had been running since 1888 on the Lartigue monorail system quite successfully. In this system the coaches, locomotives, etc., run on a rail shaped like an A, the seats being back to back, with the running wheels inside the backs of the seats: small wheels at the base of the carriages serve to balance the whole system. The locomotives have 2 of everything, one on either side of the central rail. This principle was to be employed on these fast inter-urban lines, but the projects fell through. The most successful form was that invented by Brennan, involving the use of 2 high-speed gyroscopes revolving in opposite directions and in a vertical plane parallel to the direction of motion. These large wheels were kept working on ball bearings in a vacuum, and therefore continued to run for a long period, even if any mishap occurred. Owing to the precessional action of these gyroscopes, the cars tended to tilt outwards when rounding a curve, instead of inwards as provided for by banking the outer rail on an ordinary line. In spite of the great weight of each car, since it has to carry its own gyroscopes, there seems an undoubted field for their use where a temporary line has to be laid very quickly, as the track seems to require next to no foundation, and the straightness of the running rail does not seem to affect

the running of the cars. However, in one or two instances on the Continent passenger cars having streamlined bodies suspended from a single overhead rail have been introduced.

PASSENGER SERVICES AND ROLLING STOCK. In the early days passengers were conveyed at speeds varying with the class or fare charged; thus first and second class and those who travelled, as many did, in their own carriages placed on trucks were moved more rapidly than the third class or 'parliamentary' passenger. This state of affairs continued till 1872, when the then general manager of the Midland announced the startling news that third-class passengers would be conveyed on all trains. As at that date the Midland were employing Pullman cars at a supplementary fare on first class, in 1875 they abolished second-class carriages, and reduced first-class fares almost to second-class level. Originally fares were fixed on the basis of 3d., 2d., and 1d. per m. for the 3 classes, but as one line after another abandoned second-class carriages or retained them only for a restricted service, and also reduced their first-class fares, 1d. per m. for the third class and about 2d. per m. for first class became very general. In 1917, in consequence of the First World War, all fares were increased by 50 per cent, excepting workmen's, season, zone, and those on the London tubes. In 1920, owing to the inflation of money, there was a still further increase to 75 per cent over pre-war level. But this addition remained in force only till 1923, when 50 per cent over pre-war rates became the recognised standard. In June 1956 the third class was replaced by the second class in order to bring about a greater uniformity with Continental services (a two-class system is now used on most Continental lines). Fares for the second class are on the same basis as the old third class, 1-9d. per m.; and first-class fares are 50 per cent higher.

From 1872 to the time of the outbreak of the First World War was a period of active railway expansion, and, although during the last few years of that time motor traffic was already drawing upon the business of the R. In many parts of the country, the companies were experimenting with electric power in suitable areas, particularly in the S. of London. Broadly, the hist. of the period was one of railway enterprise and public response. Just as speeds increased, so also the style of accommodation improved, so much so that the last part of the 19th and the early part of the 20th cent. witnessed a remarkable revolution in railway travelling. Dining-cars, long vestibuled expresses, corridor carriages, and means of getting refreshments *en route* provided attractive travelling, while traffic superintendents and general managers attracted their traffic by providing the right sort of train at the right time. Typewriting compartments were introduced on 2 trains each way between London and Birmingham. Even suburban lines, like the Metropolitan Extension, started their

Pullman breakfast cars; Claughton had its midnight supper car: everything was done to attract the man who need not travel, i.e. who goes only because it is sufficiently attractive. After the First World War this progressive policy was well maintained in long-distance passenger traffic. Carriages are steam-heated at the control of the passengers; improved ventilation has eliminated draughts and, on some modern trains, air-conditioning is provided, but of course not all rolling stock reaches the high standards of the best trains, and there is still much out-of-date stock in use, especially on local and cross-country services.

A notable improvement in recent years has been the introduction of buffet cars, the first modern car of this kind running between London and Cambridge in 1932. Recently experiments have been carried out in France on pneumatic rubber-tyred wheels for passenger coaches. This add-



LOUNGE CAR ON THE PIERRE MARQUETTE RAILWAY, U.S.A.

to the comfort of travelling by eliminating the 'hammer-blows' of the steel tyre at rail joints, but on high-speed trains the life of the rubber tyre would be short, and experience in working is still lacking. Three trains with pneumatic-tyred cars hauled by steam engines were put into service on F.R. after the Second World War, railcars with such tyres having been introduced in 1931.

Owing to their increasing luxuriousness, express trains have become very heavy. Corridor coaches weigh 35 tons, dining-cars 40, sleeping-cars (holding 10-12 passengers) also 40; hence the modern express totals up to 500 or more tons exclusive of the locomotive, or with it 670. Platforms were the next difficulty, as at some stations, especially terminals, long trains could not be accommodated, and even if they could the locomotives were hampered by loading gauges. The length of the Cornish Riviera express is 1050 ft. or nearly a fifth of a m. Admitting the necessity for duplicating long-

distance traffic, the superintendent finds that there is no room for local trains. This entails duplication of the line, and that, too, probably in the most expensive part. On a line with a fine long-distance traffic a sudden growth of suburban trains is a serious thing. Admitting that this is largely a 2-period traffic, yet it may have to overflow to the express lines, and so the problem comes of what steps are to be taken to meet this expanding traffic. On the old G.E.R. section of the L.N.E.R., with probably the heaviest suburban traffic in the world, everything possible was done without altering its lines. The carriages were widened to seat 6 a side, the platforms were lengthened, 2 more coaches added to the trains, and more powerful locomotives were built. One obvious remedy, if it be called on to meet any further increase in traffic, is the electrification of its existing metals: this has been done between Liverpool Street and Shenfield, and is now being extended to Southend-on-Sea and Chelmsford.

Eng. R., looked at from the point of view of speed and precision, stand pre-eminent. On certain lines trains of enormous weight are taken at speeds that do not fall far short of the m.-a.-min. timing. The long non-stop runs that are such a feature of Eng. services have been made possible by Ramsbottom's pick-up water troughs, whereby the water can be renewed at speed, and (more important still) at places where the water is suitable for boilers. The longest daily non-stop run in the world is from King's Cross to Edinburgh. The record for this is held by the *Elizabethan*, which covers the 393 miles at an average speed of 60.5 m.p.h. The *Talisman*, introduced in 1956, operated regularly in the winter services at a slightly lower speed. During the summer of 1956 there were 57 trains making complete runs at average speeds of 60 m.p.h. or more, of which the fastest was the *Bristolian*, covering the 118 m. from Paddington to Bristol at an average of 67.6 m.p.h.

Speed is a ruling factor, and the R. have not been able to disregard it. The public in Britain naturally think that the 60 m.p.h. level ought to be accepted (as it was in France and Germany before 1939) as the standard of speed on the main services from the metropolis. The demand for higher speed, however, gives rise to numerous special difficulties, such as

greater visibility of signals. An express train of 12-13 coaches travelling at 60 m.p.h. can be brought to a stand in approximately 360 yds. The vacuum brake is used on most steam trains, and the Westinghouse compressed-air brake on electric trains.

The R. also run purely postal trains which only convey passengers by permission, solely composed of travelling post-office vans and the like, whereby bags are discharged or picked up at speed.

Newspaper specials, too, are chartered by the prin. London dailies, which, by going to press an hour or two earlier, reach their destination ahead of the pub. of local papers. Railway stations, especially in industrial dists., are often grimy and depressing. The London Passenger Transport Board has set a high standard, and many of its stations are even attractive. Waterloo station has been greatly improved, and Paddington is also a model of convenience. The companies made considerable improvements in many prov. stations, notably at Chesterfield, Exeter, Leeds, Sheffield (Victoria), and Twickenham, some of which have been completely remodelled.

GOODS SERVICES. It is from these that the R. derive the greater part of their income, and the prin. portion of the goods is carried under the classification of minerals. Indeed, it was for this purpose that the Stockton and Darlington line was originally promoted, as at that time the whole of London's coal supply came by sea from the N.E. ports. When the Midland and S. Yorkshire coal pits had lines constructed in their vicinity, the only railway then running to London (the London and Birmingham) refused to carry coal as being detrimental to the better-paying passenger and merchandise traffic. It was not till the G.N.R. was opened in 1850 that London had its first regular railborne supply. Here be it said that in order to equalise matters in the case of collieries, the strict mileage charge is often abandoned, as it is found more profitable to charge the traffic what it will bear. Goods in general are divided into 8 classes: A, B, C, and 1-5. The rates charged are lowest for Class A, which includes minerals in the raw state, and highest for Class 5, which includes the most expensive and fragile manufactured articles. Again the lettered classes are generally removed by the consignee, whilst the numbered goods have to be collected and delivered; but the whole basis of charging may be altered by a Freight Charges Scheme now in preparation. It has often been remarked that the Eng. R. employ such small wagons for such a lot of traffic, but the reason is not far to seek. The R. cannot afford to wait till they have collected enough goods to form a 30-ton load, and so the smaller-sized trucks are employed. The same applies even in the case of coal, though there must also be added the reason that colliery sidings often do not allow large trucks in them, owing to the loading gauge, which is more restricted than usual. Mineral wagons are now being built of 24½ tons capacity—the maximum load permissible on 2 axles. The R. have now ample numbers of the newer big trucks and certain specially built ones for carrying awkward consignments, e.g. big guns, girders, or large castings and boilers. 'Containers', or big enclosed steel or wooden receptacles, have proved of great value. These containers in many cases are adapted to occupy a railway truck and also to stand upon a

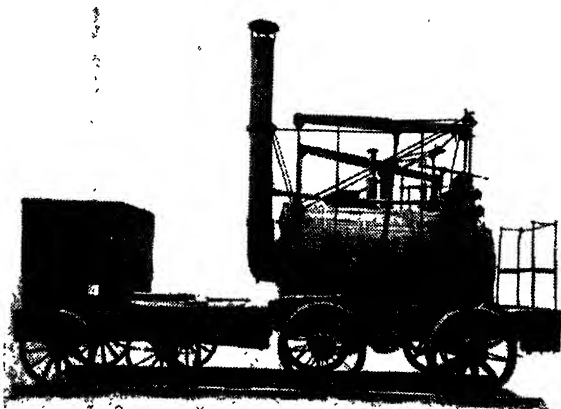
trolley. They have appliances and fittings by which they can be transferred from one vehicle to another or into the hold of a ship. Much attention has been paid in recent years to the modernisation of goods depots and terminals, and the lay-out of the latter has been entirely remodelled to facilitate more rapid handling of goods. The greatest pre-war improvement was the speeding up of freight trains. Express freight trains run throughout the night between all important centres, and the fastest are composed entirely of vehicles fitted with continuous vacuum brakes, like passenger trains, and this enables them to average speeds of 45 m.p.h. or more. In meeting the needs of modern traders the R. have developed ancillary road services. The railhead depot system, too, offers the advantages of rapid transit in bulk by rail with the flexibility of road transport distribution in small quantities. Though the general trend in retail trading has been in the direction of smaller consignments (largely owing to fluctuating prices) there has been a period in the opposite direction for some kinds of traffic, in connection with wholesale and industrial traffic, notably milk, oil, and petrol, which are carried in tank wagons, and grain, bricks, steel sheets, etc., which are also carried in specially constructed vehicles. Bulk forwarding of liquids enables economies to be effected in handling and in the capital outlay required as compared with carriage in barrels or other small containers. During recent years experiments have been made in providing shock-absorbing wagons for conveying glass, earthenware, concrete pipes, and other articles particularly liable to damage.

SIGNALLING. The route mileage of the R. of Great Britain is about 19,000, and the number of train m. about 380,000,000, worked by about 18,500 locomotives, giving an average of a train every half-hour each way over each m.; taking into account the large amount of single track (about 7200 m.), this is a very high traffic density. Before the days of block signalling and telegraphs the time interval was the only means of keeping a proper distance between following trains, so that, if the front train broke down, and notice could not be sent back to the nearest semaphore, a collision was most probable owing to the imperfect brakes then available. To-day the tendency is to replace as much of the signalling apparatus as possible by automatic or semi-automatic installations. First of all, from the ordinary telegraphic instruments came the block signalling, in which there is always a clear section between two following trains. Next came the lock and block, which interlocks the signals and telegraphic instruments, and so forces the signalman to maintain that section unoccupied. This is the system in most general use to-day. Lines with very intense traffic, however, require something better, which is found in automatic signalling, whereby the trains themselves automatically work the signals behind them. This, coupled with a trip-

catch for applying the brake, makes it possible to run 45 trains per hour on the London Underground. Automatic signals are worked electrically by means of a track circuit, and are kept at danger behind a train until it has passed out of the section. The salient advantage of automatic signalling is that it allows of the number of block sections being increased, thereby speeding up train movements without involving the expense of installing extra signal-boxes. Electric colour light signals of the searchlight type are used for both night and day operation. They have great penetrative powers in fog and mist. Increasing use has for some time been made in all the Brit. systems of electric colour light signalling. Progress has also been made in the power operation of points, and manual levers are being superseded by miniature levers operating electric circuits. The most effective solution to the problem of fog working is through automatic train control, whereby the position of each signal on passing is indicated to the driver by either an audible or visual signal in the engine cab. The G.W.R. had, by 1939, extended its system of automatic train control over the whole 2800 m. of main-line routes from London to Penzance, Chester, and Fishguard. This system also operates on the lines from Fenchurch Street.

On single lines it is necessary to prevent collisions not only between following trains, but also between opposing trains. At first, each section of the line had a corresponding 'staff,' and no engine was allowed in a section unless its driver had the staff in his possession. But sometimes a staff might get left at one end of a section when a train wanted to traverse it from the other. Nowadays the electric staff is used; there are sev. staffs for each section, but they are kept in special machines at each end, which are electrically interconnected so that not more than one staff at a time can be removed from the 2 machines. The staff machines also lock the signals. Formerly signal-boxes were independent units, responsible only to the station-master, and dealing with traffic as it came along. Nowadays 'train control' is largely installed, by which signalmen are still responsible for the area covered by their boxes, but they report to and receive instructions from a central office called 'Control,' which has a bird's-eye view of the whole line, and can decide better than the signalman which trains to let by and which to hold up.

ECONOMICS. *Britain.* The only justification of railway making (in Britain before the Transport Act, 1947) is economical haulage, which term implies both mechanical power and concentration of load. The provision of the former naturally falls on the railway company, as being beyond the means and requirement of an individual carrier, and in practice the R. nearly always perform the carriage of passengers, except in the cases of the *Compagnie Internationale des Wagon-Lits*, the *Pullman Company*, and certain other instances. In the case



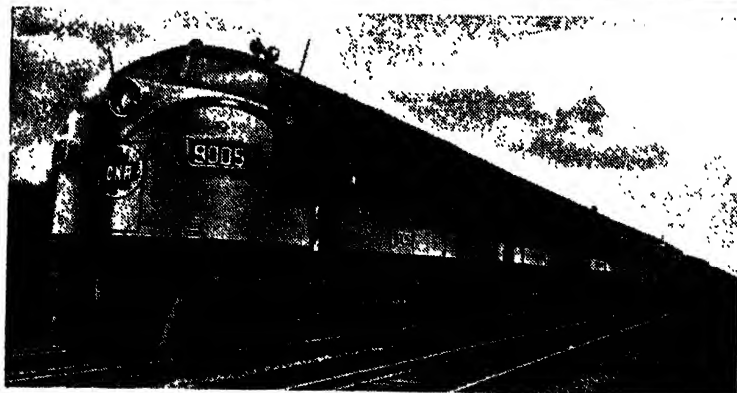
HEDLEY'S 'PUFFING
BILLY' LOCOMOTIVE
1813

*Crown copyright
Science Museum,
South Kensington*

4 6-2 'PACIFIC'
CLASS LOCOMOTIVE
1948

*(Standard livery
1919)*

British Railways



CANADIAN NATIONAL RAILWAYS 9000 CLASS DIESEL LOCOMOTIVE, 1949

of mineral traffic in England it was usual for the wagons to belong to the private owner, but when on the railway they were in entire charge of the company. When speaking of a railway company and its general merits, it must be considered in 3 lights: (1) as owning the road; (2) as owning the rolling stock; and (3) as a carrier of all sorts of traffic. This combination differentiates a railway company and its charges from all other modes of transport and the charges usually in force. Steamship companies have not to provide the road, omnibuses use roads provided by taxation, so did stage-coaches; canal owners and turn-pike trusts merely provided the road. Hence railway rates have to cover interest on capital spent, together with charges on current expenditure.

Taking only round figures of Eng. R., before nationalisation, as illustrative of railway working throughout the world, it will be found that the money actually spent on the lines and their miscellaneous property, e.g. hotels, steamers, etc., was well over £1,200m. To show for this the R. possessed about 20,000 m. of line and approximately 1,000,000 vehicles, including over 20,000 locomotives. Of this large sum about £900m. represented irrecoverable capital because, after paying all preliminary expenses, if the line was of no use *qua* railway, it was of no use for anything else; none of the 'way and works' could be moved elsewhere: viaducts, bridges, platforms, etc., were all fixtures, and even the buildings were too specialised to admit of any other use. But once made, the ann. expenses were low, as some £15m. served (1939) to keep in repair these large capital works. With regard to the huge sums invested in rolling stock, it may be noted that, though a railway has to be complete at the time of opening, the full amount of stock need not be provided till the traffic requires it, as additions can be made without much difficulty. But against this fact must be put the necessity of providing enough stock to meet the maximum demand. This maximum requirement probably exists only for a limited period in the year, so that during this period the vehicles should earn enough to cover, in addition to current expenses, the capital charge of their construction. For this reason the R. found it profitable to run cheap excursions during the rest of the year, so as to employ vehicles which would otherwise be standing idle. The earliest lines, as has been seen, were merely mineral lines, carrying no passengers. The first passenger line was the Liverpool and Manchester, opened in 1830. Although it was primarily promoted to carry goods, the passenger traffic was so heavy that at first the goods were crowded off the road. In 1845, when most of the trunk lines were opened, 75 per cent of the revenue came from passengers, and on some lines, e.g. the London and Birmingham and G.W.R., it was as high as 85 per cent. In 1939 the ratio was changed and the average of

goods and passengers was 55 per cent and 37 per cent respectively, the other 8 per cent coming from canals, hotels, etc. In the forties passenger traffic consisted of well-to-do people, customers of the post-chaises and stage-coaches paying an average fare of fully 2d. per m. Seventy years later 90 per cent travelled third class at an average fare of under 1d. per m.

During the First World War, and, later, owing to the increase in competition from motor-drawn vehicles, such a serious change took place in railway economics that most of, if not all, the old methods of statistical calculation were no longer the precise guides by which future policy could be shaped. In consequence, many bigger issues, which at one time could have been ignored, were then necessarily brought into any consideration of the subject. One of these was the important subject of railway expansion. The principle has been expressed that when the provision of new R., such as the recent extension of tubes in London, is necessary for the public, the public must provide the fund, or join in some guarantee to those who do so. Again, the formation of a Ministry of Transport, and the active part that that ministry took in the arrangement of London traffic in particular, was a reminder both to the R. and the general public that there were mutual obligations, and whatever happened the public must be served. The nationalisation of Brit. R. was the culmination of this line of development. A third point that has a great deal of significance is the growing belief that the steam-drawn train with all its brilliant hist. belongs to a waning period.

Ann. expenditure by the R. of Great Britain had risen sharply since 1913 owing to the wage and price increases. In 1923 expenditure was about £157m.; it decreased subsequently and was £136m. in 1930, £142m. in 1933, and, just before the Second World War, it was £148m. In 1948 it was £311m. Gross revenue is the total income from all kinds of traffic and revenues which are derived from ancillaries; net revenue is the total gross receipts minus working expenses; and the proportion of the receipts absorbed by working expenses is known as the 'operating ratio.' In 1913 this ratio was 65 per cent, in 1939 about 90 per cent, and in 1948 92 per cent. The Railways Act, 1921, limited the ann. revenue that might be earned by the 4 groups to approximately £50m. This standard revenue was based on 1913 revenues, but minor adjustments could be made from year to year. In 1937 railway companies were authorised by the Railway Rates Tribunal (now Transport Tribunal) to increase their charges by 5 per cent in order to bring railway revenues nearer to the standard.

Financial results for 1955 show the following figures: total gross receipts, £452,300,000 (passengers, £118,100,000; coal and coke, £118,800,000; other freight, parcels, etc., £197,000,000; col-

lection, delivery, and other road services, \$12,300,000; miscellaneous, \$5,700,000; total working expenses, \$452,100,000; net traffic receipts, \$200,000.

America. In the U.S.A. the great transcontinental R. had been given princely domains by the U.S. Gov. Every alternate section along the road was theirs. In all, 116,000,000 ac. had thus been given away. The Union Pacific received 20,000,000, Santa Fé 17,000,000, and the Northern Pacific 44,000,000. But the R. were entirely dependent on business, and there was no business unless these and other tracts were settled with people consuming manufactured products and raising crops for the E. markets and for export. The great roads, therefore, scoured the E. part of the U.S.A. and Europe with a view to inducing people to settle in the wilderness of plains. They offered them cheap transportation, and land at from \$1 to \$10 an acre. In this way the empty spaces began to be filled with people. The states and ters. began to grow. The hunger for more railway services increased. These were essentially the days when popular favour ran high. States and ters. granted the R. exemption from state taxes and further land grants, and bought stock in the companies in order to induce them to extend their lines. Tns and cities, desiring to have railway connections, gave them free sites for stations and tracks and also subscribed for their stock. But this period of mutual goodwill was soon followed by an era of intense bickering. The R. were guilty of various abuses. There were stock-watering and other financial manipulations. In many instances exorbitant freight rates were charged. Free passes were given to members of the state legislatures to influence their attitude on various bills. Freight rebates were given to favoured concerns. By entering state politics railway managers prevented just taxation and regulation. Finally, the state of Illinois took the lead by the new constitution it adopted in 1870. It provided for a railroad commission to prevent unjust discrimination, and to fix maximum rates which might be charged. By 1874 Iowa, Minnesota, and Wisconsin had followed suit. The R. attacked the constitutionality of these enactments. In 1876 the U.S. Supreme Court held that when private property was affected with a public interest, it ceased to be private property only, and so was subject to regulation. The same day it decided in another case that it was perfectly legal for states to pass laws fixing the maximum rates for passengers and freight traffic. Later decisions, however, modified this position, and put the onus of the proof on the regulating bodies. Those decisions, in fact, made it clear that while states could regulate commerce which was local in character, they could not touch it if it had in any way an interstate character, and as most commerce was interstate, this put the issue squarely on Congress. The latter replied to this by passing in

1887 an Interstate Commerce Act which prohibited pooling, freight rebates, and higher charges for short hauls than for long ones as was done in many flagrant cases, and required that all charges should be 'just' and 'reasonable.'

More important than these vague prohibitions and requirements was the provision in the Act for a federal Interstate Commerce Commission to supervise the operation of the law. The act was, however, long ineffective; but in 1903 Congress passed the Elkins Act, which once more forbade freight rebates and made the R. subject to prosecution and penalties. In 1906 the Hepburn Act made rate regulation possible by giving the Interstate Commerce Commission power to fix them, subject to judicial review, but with onus of proof now on the railroads. It also forbade the giving of any passes save to bona fide employees of the R. or to the members of their families. In 1920 Congress gave the Interstate Commerce Commission complete power to make all rates, with a view to giving the shareholders a fair return on their investment and the public fair rates. When the U.S.A. entered the First World War it took charge of all the R., and ran them practically as one system. The railway managers, upon getting their property back, claimed that immense harm had been done to their earning capacity. The law was the answer. But the law did not fix what Congress thought would be a fair return on the value of the railway property. For 2 years, therefore, Congress fixed it at 6 per cent, of which one-half of 1 per cent was to make provision for capital expenditures. Thereafter the Interstate Commerce Commission was to decide the question. In 1922 this body fixed the return at 5½ per cent, and at that figure it still stood in 1940.

Another important section of the law of 1920 provided for the ultimate consolidation of all the railroads in the U.S.A. into a limited number of competing systems, the object being to reduce overhead expenses and to increase efficiency. The Interstate Commerce Commission commissioned Prof. W. Z. Ripley of Harvard Univ. to prepare such a plan of consolidation. After various hearings the Interstate Commerce Commission, on 9 Dec. 1929, announced its final plan, which provided for the consolidation of all the R. in the U.S.A. into 21 major systems. The railway managers of the R. serving part of the E. U.S.A. prepared a plan in accordance with this, whereby the 4 main competing systems should be the Pennsylvania, Baltimore and Ohio, New York Central, and the Chesapeake and Ohio-Nickel Plate system. This was not ratified by the Interstate Commerce Commission, and some of the railroads it was proposed to incorporate in these systems did not fully agree to it. The New Deal (q.v.) came to the aid of the R., which had been hard hit by the great world economic depression of the 1930s, brought about consolidation of facilities, and financed long-overdue improvements.

For LOCOMOTIVES see separate article.
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Raimondi, see MARCANTONIO.

Rain and Rainfall. Rain is the prin. form in which water falls from the sky. The complete physical explanation of the formation of rain is still a matter of debate. At all temps. water can exist in vapour form up to a 'maximum' or saturated vapour pressure, which increases markedly with increase in temp. (being, in the presence of a plane water surface, 1.5 millibars (mb.) at 0° F., 3.7 mb. at 20° F., 8.4 mb. at 40° F., 17.7 mb. at 60° F., and 34.3 mb. at 80° F.). When this saturation pressure is exceeded the water vapour tends to condense into water droplets or ice particles; and, in the atmosphere, this is achieved by cooling the air either by contact with the ground, when dew, frost, or fog are formed, or by lifting and cooling by adiabatic expansion (because of the decrease in pressure), when first cloud droplets are formed, and later, as the upcurrent becomes insufficient to support them, liquid or solid particles which fall to the ground as drizzle, rain, sleet, snow, or hail. Since the saturation pressure in the presence of ice is lower than with water for given temps. below freezing, ice particles should form more easily than water droplets. However, another necessary condition is the presence of a nucleus, i.e. tiny particle of matter, on which the water vapour can begin to condense into a water drop or to sublimate into an ice crystal: this is because the surface tension over a small water drop requires a certain amount of super-saturation, which is very large for the smallest droplets, which must be formed first, and a nucleus gives the drop a flying start over the difficult first stages. Condensation nuclei are always present in the atmosphere, but sublimation nuclei are of 3 kinds: a few on which ice crystals begin to form when the temp. falls below -10° C., many more on which ice forms below -32° C., and all other nuclei on which ice forms below -41° C. Although ice crystals have been observed

in the atmosphere at temps. as high as -6° C., these values, which were discovered in the laboratory by Findeisen and Schultz, are considered fairly reliable; so that, between 0° and -10° C. clouds consist of supercooled water droplets, between -10° and -32° C. of supercooled water droplets with a few ice crystals, between -32° and -41° C. of more ice crystals but still many more droplets than crystals, and below -41° C. of ice crystals only. Water droplets and ice crystals thus formed are visible as cloud and tend to fall to the ground through the air. Because of air resistance the velocity of fall soon reaches a maximum and, if the rate of ascent of the air is greater than this, the cloud remains in place. Cloud droplets vary in size from a fog droplet of radius 0.001 cm. up to 0.01 cm. with corresponding maximum falling velocity from 2½ ft per min. to 140 ft per min. (i.e. less than 2 m.p.h.). Dr T. Bergeron claims that these drops do not usually grow or coalesce with each other and, in fact, that in the cloud at any one part they tend to become uniform in size, so that they fall as very small droplets (usually less than ½ mm. in diameter) which are known as drizzle. Bigger drops, such as raindrops, are usually formed, according to Bergeron, by condensation of water vapour on or collision with ice crystals falling at a different speed through the cloud. From this follows the theory that many rain-bearing clouds must extend into regions where ice crystals begin to form, i.e. well above the freezing level. Above this the drops on collision will freeze into snow and hail, melting into rain as they pass into warmer regions. As they become larger they fall faster through the air, continuing to grow whilst within the cloud but tending to evaporate on passing through cloud-free dry air. The view to-day is that the Bergeron process is by no means the only way in which clouds produce rain, and that in many cases (especially in hot countries) direct coalescence of drops occurs without an intermediate ice-phase. The maximum velocity of fall of different sized raindrops for diameters 0.5, 1.0, 2.0, 3.0, 4.0, and 5.5 mm. is 10, 14, 19, 23, 25, and 26 ft per sec. respectively; above 5.5 mm. diameter the maximum velocity no longer increases with size because of the change in shape caused by external pressure and viscosity, which also set up internal stresses and strains breaking the drop into smaller drops, so that raindrops are never observed larger than this, nor do they fall to the ground faster than 26 ft per sec. or 18 m.p.h.

Artificial Production of Rain. Recently experiments have been made in Russia, America, Australia, and England to utilise the consequences of Bergeron's theory of the formation of rain and to produce the rain artificially by speeding up the growth of the droplets. One method is to dust the top of a suitable cloud with solid carbon dioxide (seeding as it is called). As these very cold particles pass through the cloud they form

a large number of ice crystals which will fall through the cloud to produce rain by the Bergeron process. This method involves the use of aircraft, and is thus expensive. Another method, which has been tried extensively in the U.S.A. and elsewhere, is to seed the cloud with particles of silver iodide released as a smoke by generators on the ground. This is based on the fact that silver iodide has a crystal structure like that of ice, and has been shown, in the laboratory, to change clouds of supercooled drops to ice. Despite extensive trials, however, the effectiveness of this form of seeding has yet to be established. The position now is that seeding from the air by solid CO_2 pellets has been shown, on occasion, to result in changes in cloud structure and sometimes a fall of rain or snow over a restricted area. Seeding by silver iodide from the ground has not yet been proved beyond reasonable doubt to give results of economic value, but the method may be of value in increasing precipitation in mountainous regions. In all cases, clouds of a suitable type must be present before there is any chance of success, and it is clear that the increase of precipitation caused in this way is not likely to be more than 10 or 20 per cent of that occurring naturally.

Distribution of Rainfall. If the temp. is high, then more water can be present as vapour in the atmosphere (because of the higher saturation vapour pressure) so that more water is available for condensation, and therefore heavier rainfall is likely in summer or in warm climates. Heavier rain is also more likely with strong up-currents, for then the water vapour is being condensed more quickly; consequently, the more violent rain clouds, such as cumulonimbus, are likely to produce more intense rainfalls than the steadily rising sheet clouds, although since these are very widespread and all the air is being lifted instead of just the small area of the cumulonimbus cloud, their rainfall is usually prolonged with a heavier total rainfall over a large area. Mts will accentuate the uplifting in both cases, and therefore heavy rainfall is typical of mountainous or even hilly regions. On the other hand, descending air, because of the increase in pressure, is warmed adiabatically so that the air becomes unsaturated and the cloud droplets become smaller and evaporate, the rainfall being decreased considerably if not missing altogether. Thus mts and even quite low hills exhibit a much increased rainfall on the exposed side and comparatively dry conditions on the lee side. This sheltering effect is referred to as a rain shadow. Depressions and anticyclones are regions of generally ascending and descending air, so that rainfall is prevalent towards the centres of low pressure and very rare in centres of high pressure. Thus high temps. (with high humidity), low pressure, mts, and nearness to the sea all contribute to high rainfall, whilst low temp., low humidity, high pressure, shelter from moist winds, and remoteness from the seas

contribute to low rainfall. In different places these conditions occur in different proportions, so that the prevalence of winds from the sea may be balanced against low temps., high mts against dry air, as in Turkestan or S. Rockies, persistent high pressure against moist air as in the Azores, and high temps. against persistent land winds, as in the Sahara or India during the N.E. monsoon.

This balancing of conditions is well illustrated in the Brit. Isles, where the more stormy weather brings in winter about the same average rainfall as the warmer, not so stormy weather in summer. The average monthly rainfall (1881-1916) in the Brit. Isles, taken as a whole, is shown in the following table, reproduced from *Book of Normals of Meteorological Elements for the British Isles* by permission of the Director of the Meteorological Office.

	in.
January	3.78
February	3.26
March	3.22
April	2.52
May	2.61
June	2.64
July	3.25
August	3.88
September	3.09
October	4.25
November	4.19
December	4.72

Total for the year . . 41.41

It will be noticed that Dec. is the wettest month, April the driest; Feb., traditionally 'fill-dyke,' is the driest winter month, whilst the popular holiday month, Aug., is the wettest summer month. Along the E. coast of England July and Aug. are in fact the wettest months of the year because of summer thunderstorms. But the rainfall over the Brit. Isles is very variable; in some months no rain fell over large parts of the country, notable dry months being Feb. 1891 for central and S.E. England, and Aug. 1948 for Scotland; and at Eallabus in Islay rain fell every day for 89 days from 12 Aug. to 8 Nov. 1923.

A belt of heavy rainfall extends along the region N. and S. of the equator, bounded on each side by regions of drought in the lats. of Cancer and Capricorn. The trade wind regions are not rainy. The regions of the westerlies, N. and S., are marked by cyclonic disturbances and good precipitation, the polar caps again being comparatively dry because of low temps. This general scheme is greatly modified but not obliterated by the distribution of land and water. The trade winds striking the E. coasts of the continents make them regions of rain, especially in summer, the W. coasts, where they leave, being dry. Australia, Africa, and S. America are good examples of this. In the region of the westerlies of the S. hemisphere, the W. coasts are rainy and the E. drier; in the N.

hemisphere the W. coasts are rainy towards the N., e.g. Europe and Brit. Columbia, the E. coasts more to the S., e.g. China and U.S.A., where the trades are drawn into the continents by the formation of summer cyclonic areas. The interiors of the 2 great N. land-masses are regions of slight rainfall, but the heat of summer causes them to form indraughts from the ocean, adding a further complication to the planetary scheme; and in winter they form the centres of anticyclones, with dry winds flowing out over the oceans. This action predominates in the Far E., where SE. Asia, the monsoon region, gets summer rains and winter drought. Certain regions are marked by uncertain rains and droughts, e.g. the Deccan in India, W. New S. Wales and Queensland, and parts of S. Africa and S. America; places lying on the boundary of rain shadows, or where conformation of land renders them particularly sensitive to alterations in strength of wind. The swing of the sun from Cancer to Capricorn and back again in the year produces a sympathetic change in wind systems, giving seasonal variations in rains: within the tropics the 'rain follows the sun.' The westerlies produce more rain in the winter, when their cyclonic eddies are more intense; winter rains are characteristic of 'Mediterranean regions,' 28°-40°, which are influenced by trade winds in summer, but are fringed by the westerlies in winter, e.g. Cape Prov. and W. Australia; the E. coast of S. India, of Ceylon, and the Indo-Chinese peninsula get rain with the NE. monsoon when the main region is dry, and they are drier during the SW. monsoon. Over the ocean the heaviest rainfall occurs in the Pacific Ocean between the E. Indian Archipelago and the Ladrones; on land it is found where the winds from the warmer oceans encounter high mts near the coast, e.g. Nigeria, W. Indies, Burma, etc. Cherra Punji (Assam) has a mean ann. rainfall of 464 in. (40.8 in. were recorded on 14 June 1876); Mahabulshwar, near Bombay, 260 in.; while in the track of the westerlies, New Zealand, S. Chile, Norway, and NW. America show similar conditions.

Heavy rainfall, as we have seen, is associated with strong updraughts; these are typical of intense cyclones and thunderstorms; such heavy falls in England have included 1.25 in. all within 5 min. at Preston, Lancashire, on 10 Aug 1893; 2.90 in. within half an hour, at Cowbridge, Glamorganshire, on 22 July 1880; 3.63 in. in 1 hr at Maldenhead on 12 July 1901; 4.65 in. in 2½ hrs at Campden Hill, Kensington, on 16 July 1917; and as much as 8 in. in 5 hrs near Bridgwater on 18 Aug. 1924; the greatest fall in one day in Britain was 9.56 in. at Bruton, Somerset, on 28 June 1917. Abroad, 30.11 in. fell at Gibraltar on 25 Oct. 1836, and at Baguio in the Philippines a typhoon between 14 and 17 July 1911 deposited 36, 29, 17, and 8 in. respectively, a total of 89 in. in 4 days, 45.99 in. falling within 24 hrs on 14th-15th, which is the world

record. On mt ranges the rainfall has a maximum at a varying height depending on the wind current of the season; in the Alps this is 3000-4000 ft in winter, 6000-7000 ft in summer; in the mt stations of Hindustan the height is about 4000 ft; in the Eng. Lake Dist. over 1000 ft. The level above which the rainfall decreases has been named by Supan the inversion level.

See also METEOROLOGY; SNOW. See Meteorological Office, *Book of Normals of Meteorological Elements for the British Isles*, Section V, 1924; Royal Meteorological Society, *Rainfall Atlas of the British Isles*, 1928; C. E. P. Brooks, *Climate*, 1932, and *The English Climate*, 1954; T. Bergeron, *On the Physics of Cloud and Precipitation* (Report of the Meteorological Association, Union Géodésique et Géophysique Internationale, Lisbon), 1933; E. G. Bihham, *Climate of the British Isles*, 1938; U.S. Weather Bureau, *Record Rainfalls of the World in Monthly Weather Review* (vol. lxi, p. 356), 1941; E. E. Foster, *Rainfall and Runoff* (New York), 1948; W. G. Kendrew, *Climate*, 1949; H.M.S.O., *British Rainfall* (ann.).

Rain-gauge. Rain is collected for measurement in a R. It is usually made of copper, the upper detachable cylinder containing a funnel, above which it rises considerably and terminates in a clean-cut edge 5 or 8 in. in diameter. The measuring-glass is graduated to show the amount of rainfall to the nearest tenth of 1 mm. or hundredth of 1 in., and tapers towards the bottom to show small amounts. Many precautions are necessary as to the placing of the R., for which see works on meteorology; the most important precaution is the selection of a perfectly open site to catch the rain from every direction, far enough from the ground (best covered with short grass) to prevent splashes bouncing into it, and yet not so far from the ground that in a high wind its own eddies blow away some of the rain. Brit. practice is to place the R. at a distance from any object more than twice the height of the object and with its rim 1 ft above level short grass. Self-recording R.s are in use; these work by means of a float and style tracing on a revolving barrel, or are emptied at definite points by syphons or overturning of the collecting vessels. See *Meteorological Observer's Handbook*, 1942 ed., H.M.S.O., 1946.

Rain-making. In many societies, esp. in Africa and Australia, there are practitioners who are thought to control the rain and weather. The power is usually believed to come from God. Rain-makers may be important men in the community, and the authority of chiefs or kings may rest largely upon this power. The Queen of the Lovedu (q.v.) is a famous example from Africa. Rain is usually made by the manipulation of rainstones or other sacred objects, or by prayer. For scientific methods of R. see RAIN AND RAINFALL, *Artificial Production of Rain*.

Rainbow Corner, the corner of Shaftesbury Avenue and Great Windmill Street, London, on which stood the Amer. Red Cross club during the Second World War. In 1949 a plaque, bearing the name R. C., was erected by the Fellowship of U.S.-Brit. Comrades as a tribute to all ranks of the U.S. services who knew the original R. C.

on leaving, those between 8500 and 8600 all had an angle of deviation within a few minutes of the minimum angle of deviation. There is therefore a narrow concentrated beam of light emerging from the raindrop at the minimum angle of deviation, which as the colours are dispersed, gives a coloured spectrum, red, orange, yellow, green, blue, indigo, violet, the red

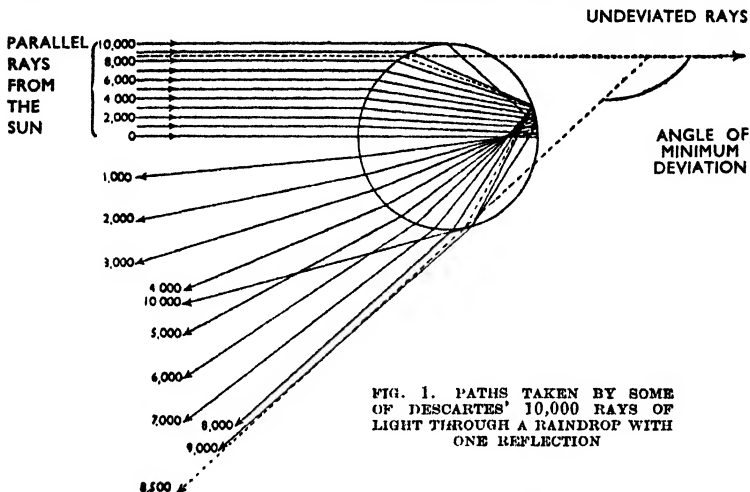


FIG. 1. PATHS TAKEN BY SOME OF DESCARTES' 10,000 RAYS OF LIGHT THROUGH A RAINDROP WITH ONE REFLECTION

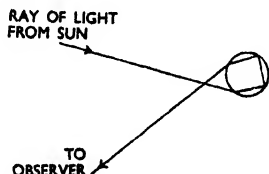
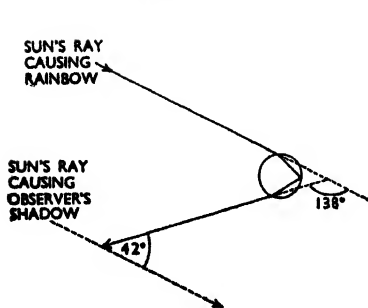


FIG. 3. PATH OF RAY OF LIGHT THROUGH RAINDROP TO FORM A SECONDARY RAINBOW

FIG. 2. HOW THE RAINBOW IS FORMED AT AN ANGLE OF ABOUT 42° FROM THE SHADOW OF THE OBSERVER

Rainbows are caused by refraction and internal reflection of light from the sun in raindrops. The first explanation of the rainbow was given by Descartes in 1637 depending on geometrical optics. A more complete explanation is given in terms of the wave theory, and is considered later. Using Snell's law of refraction Descartes found that of 10,000 parallel rays striking one side of a spherical raindrop (Fig. 1), after refraction on entering, one internal reflection at the opposite side and refraction again

having an angle of deviation of about 137° , the violet $139\frac{1}{2}^\circ$. Thus, all drops on a cone centred about the shadow of the observer at an angle of about 42° (Fig. 3) will appear bright in the sunlight, the colour varying from violet at about $40\frac{1}{2}^\circ$ to red at about 43° . The bow cannot be seen from the ground if the sun is at a greater elevation than 40° ; unless viewed from a height it is less than a semicircle, whilst from an aircraft the bow can sometimes be seen as a complete circle. This is the primary bow.

With two internal reflections, as in Fig. 3, the raindrops will reflect a secondary bow, at angles from about 50° for red to 54° for violet. With 3 or 4 internal reflections the bow would appear between the sun and the observer, but they are not seen because the directly transmitted light is much stronger than the concentrated beam after so many internal reflections. With 5 and 6 reflections the bows would appear near the primary and secondary bows if they were not too faint to be seen.

This explanation, due to Descartes, explains many of the R. seen, but on occasions some of the colours are missing, and the bow may not even be part of a true circle. A better explanation, from the wave theory of light, shows that, so far from there being a simple intense beam of light along the 'Descartes' angle of minimum deviation, the beam forms 2 foci very close together, the waves from which interfere and reinforce one another alternately along sev. angles, the most intense being almost along the Descartes angle. The other reinforced rays are on the violet side of the primary angle, and the bows which they form are sometimes seen as supernumerary bows. The position and distance between the 2 foci (which depend on the drop size) determine the angle of these bows; if the colours of a second bow begin before those of the first finish, the colours mix, so that the rainbow does not have its normal colour sequence. The primary angle also depends on the size of the drop, being less than the Descartes angle and closer to it the larger the drop; it is sev. degrees less for very small drops. If, therefore, the drops within the sunlight are of different sizes in different parts of the bow, it will be both out of shape and with differing colour sequences. With large drops the red of the first supernumerary coincides with the green of the primary so that the yellow band is wider than normal. With smaller drops the first colour is no longer red but orange; with still smaller drops it is yellow; other colours appear such as pink just inside the violet. With very small fog droplets a bow is sometimes seen which is white with a faint coloration at the edges—the fog bow. Lunar R. are also seen, but as a general rule the light is so faint that, to the eye, it appears white. See HALO.

Rainerius, see PASCHAL (popes), *Paschal II*.

Rainfall Stations, see METEOROLOGY.

Rainford, par. and urb. dist. of Lancs, England, 4½ m. NW. of St. Helen's. The dist. is mainly residential, but the manu. of earthenware drain pipes, from clay mined in the dist., has been carried on for nearly a century. Pop. 5000.

Rainham: 1. part of the bor. of Gillingham, Kent, England, 4 m. E. of Rochester. Rom. remains have been found here, and there is an interesting church. R. is close to the Kentish hopfields and orchards. Pop. included in Gillingham.

2. See HORNCHURCH.

Rainier, or Tacoma, volcano in Wash-

ington, U.S.A., in the Cascade range, 14,408 ft. high. It is considered to be extinct, although fumes are sometimes given off from it.

Rainy Lake, N. America, 120 m. from Lake Superior, and part of the boundary between Canada (Ontario) and the U.S.A. (Minnesota). Length 40 m., breadth 3–8 m.

Rais, Gilles de Laval, Seigneur de, see RETZ.

Raised Beaches, see BEACHES, RAISED.

Raisins, name given to the grape when dried. Quantities of R. are exported from the Mediterranean shores, while others come from France, Smyrna, and California. The variety known as muscatels is dried while partly attached to the vine, and is grown near Malaga. The process of drying takes place in the sun or in specially heated houses.

Raismes, Fr. tn in the dept of Nord, on the outskirts of Valenciennes. It has steel works and mechanical engineering. Pop. 12,200.

Raisuli, Mulai Ben Mohammed (c. 1867–1925), Moroccan bandit; b. Tetuan, of good family. He became prominent about 1903 on account of his holding Europeans to ransom. From being a mere local sheriff R. made himself master of the dist. round Tangier, and in Mar. 1905 was appointed governor of the local tribes. He was deposed Dec. 1906, after a Franco-Sp. demonstration off Tangier. In June 1907 he captured Sir Harry Maclean, who in Feb. 1908 was ransomed by the Brit. Gov. for £20,000. In 1909 he was again appointed governor of the N. tribes. At first he favoured Sp. occupation; but after 1911 he disagreed with it, and again took to the mts. He was actively pro-German during the First World War, after which there were Sp. expeditions against him. He defeated one in the summer of 1919. Another, in 1921, was at the last moment called off, and peace was made. His fortress of Tazrut was attacked by Abdel-Krim, 27 Jan. 1925, and R. was led captive to Adjir, where he died.

Rajagopalachari, Chakravarti (1879–), Indian lawyer and statesman, educ. at Bangalore and Madras, India; he began to practise in 1900. R. was closely associated with Gandhi (q.v.) from 1918 and took part in the non-co-operation movement, 1919–20. He was General Secretary, Indian National Congress, 1921–2, and a member of the Working Committee, 1922–47. He became Prime Minister of Madras, 1937–9, and during the Second World War was constantly seeking ways and means of co-operation in the war effort between the Brit. and Indian Congress. He went so far as to resign temporarily from Congress in 1942. A member of the Interim Gov. of India, 1946–7, and Governor of W. Bengal, 1947–8, he became Governor-General of India in 1948 when Lord Mountbatten left, and retired in 1950 when India became a rep. On the death of Sardar Vallabhbhai Patel (q.v.) in 1950 he became Home Minister, but retired in

1951. In 1952 he was persuaded to re-enter politics as Prime Minister of Madras and finally retired. A man of great distinction, wide culture and learning, extreme simplicity in private life, and an exceptional charm of manner, he has many friends and admirers, both inside and outside India. There can have been no more worthy recipient of India's highest award of honour, Bharat Ratna.

Rajah, or (better) **Raja** (from Sanskrit *rajan*, king; cf. Lat. *rex*), title borne by a Hindu prince. Other forms of R. are *rao*, *rana*, and *rawal*. The title of the Hindu emperor of Vijayanagara in S. India was *raya*. R.s have been in existence in India from very early times; the title was hereditary as a rule, whilst men of conspicuous valour and wisdom were also elected R.s. Chiefs of greater importance than the ordinary R.s were called *maharaja* (*maharas*, *maharana*), or great R. The Brit. Gov. recognised in many cases the sovereignty of R.s, who were allowed to rule over their own ter., and to transmit the title to their heirs. Hindu subjects of eminence, great landowners, subject princes, etc., were also called R., having the title conferred on them by the Brit. Gov. for life.

Rajamahendri, tn. of Andhra State, India, on the Godavari R., 45 m. N. of Masulipatam. R. was once the seat of the Kings of Orissa, and is now a prin. Telugu centre. A few m. below are the headworks of the Godavari Delta Irrigation system.

Rajasthan, state of India made up of a union of the former princely states of the Rajputs known as Rajputana. It lies between the basins of the Indus and the Ganges and the states of Bombay and Madhya Pradesh to the S. The Aravalli hills cross the country from SW. to NE., and the terrain NW. of the range is mainly desert (the Thar or Indian Desert) and to the SE. and E. of the range is largely fertile with stretches of forest and rich soil. R. has extremes of heat and cold, but is dry and healthy on the whole.

History. The homeland of the chivalrous Rajputs is rich in tales of valour from the earliest times. The brave R. rulers never surrendered to the Muslims, and Akbar, the Great Mogul, wisely sought to make allies of them. The dynasties of Udaipur, Bikaner, Jodhpur, Jaipur, and other states and the feudal aristocracy at their courts kept up their state till the Brit. period in India ended. Their fighting men formed notable units of the Indian Army in 2 world wars.

It was a great achievement of Sardar Vallabhbhai Patel as Minister of States in the first independent Indian gov. to persuade all the Rajput princes, their nobles, and the democratic leaders of the Congress Party in the states to enter the new union, so that by Mar. 1949, for the first time in the hist. of the proud Rajputs, nearly all of their nobility and their Jat peasants were welded together into a single state. They chose a leader to be Prime Minister of the united state of R. while the Maharaja of Jaipur was selected

to be Rajpramukh (constitutional head, with the rank of governor) for life. In 1956, however, with the redrawing of state boundaries, the state was enlarged by the addition of Ajmer and Abu Road, the post of Rajpramukh was abolished, and a commoner was named as governor.

Development. Agriculture is the main occupation of the people. This is above all the millet area of India, but wheat, gram, some rice, cotton, and sugar are also grown. R. is as a rule a food-grain deficit area. It will benefit by the supply of power from the Bhakra-Nangal project in the Punjab and from the Chambal R. scheme. There is scope for mineral exploitation. R. is the sole source of gypsum for the Sindri fertiliser plant in Bihar and also has lead, copper, zinc, silver, tungsten, iron, manganese, and large supplies of good building stone, including marble.

Culture. Rajasthani is the language of the people, but Hindi is universally spoken and is the official language. R. has a large Jain pop.—the Marwaris, who are such a power in India as traders and moneylenders. There is also a large aboriginal pop. of over 1,500,000 Bhils in the S. Literacy levels in R. are much below the average for the rest of India. The Univ. of Rajputana has 15 constituent colleges in the prin. cities of the state.

Government. The titled rajpramukh has given place to a governor who is aided by ministers responsible to a legislature of 176 members. R. sends 10 and 22 members to the Upper and Lower Houses of India's parliament respectively.

The cap. is Jaipur (pop. 291,000). Other cities are: Ajmer (197,000), former Brit. strategic outpost; Jodhpur (181,000); Bikaner (117,000); and Udaipur (60,000), lovely lakeside capital of the proudest of all Rajput princes. The area is 132,200 sq. m.; pop. 16,000,000.

Rajbansi, see Koch.

Rajendralala, Mitra (1824–91), Indian orientalist, b. near Calcutta. In 1846 he was appointed librarian of the Asiatic Society of Bengal, later becoming president, and contributing papers to the jour. All his works are of historical, antiquarian, and social interest. Chief amongst them are *The Antiquities of Orissa*, 1875, *Buddha Gayā*, 1878, *Indo-Aryans* (2 vols.), 1881, *Sanskrit Buddhist Literature of Nepal*, 1882, and *The Yoga Aphorisms*, 1883.

Rajput, race of India, spread over the N. of the country and not confined to Rajputana. The R.s claim to be the descendants of the Kshatriyas. Their early hist. is obscure, but they appeared in the 8th cent., and spread into the Punjab, Kashmir, and the Central Himalaya. Their unity was destroyed at the Moslem conquest. The majority adhere to the Hindu religion, the remainder are Muslims. They are a fine race, noted for their courage and their pride; traditionally they will not perform manual labour, but devote themselves to military service. They are divided into

clans; the prin. are the Rahtor, the Kachwaha, the Chauhan, the Jadu, the Sisohyas, and the Ponwar.



A RAJPUT OF JAIPUR

E.N.A.

Rajput Painting, see INDIA (INDIAN ART).

Rajputana, name given, before the partition of India, to a collection of more than a score of native states and one chiefship, bordered on the N. by the Punjab and lying between the United Provs. and the former Bombay presidency. See RAJASTHAN.

Rakahanga, atoll of the N. Cook Group, about 21 m. from Manihiki.

Rakiura, see STEWART ISLAND.

Rakoczy, noble Hungarian family, the prin. members of which were George I (1593-1648), who became King of Transylvania in 1629, and conquered Wallachia and many tns in Hungary; George II (1621-60), son of George I, whom he succeeded on the throne in 1648. He attempted to conquer Poland, but with little or no success. He was deposed by the Porte in 1657, but was reinstated in 1658. Defeated by the Turks, he was wounded in battle and died. Francis II (1676-1735), grandson of George II. *b.* at Bors, came to the throne of Transylvania in 1707, but, attacked by the Austrians, fled to Poland in 1710, to France in 1713, and to Turkey in 1718. He retired to Rodosto in Asia Minor, where he died.

Raleigh, Sir Walter (1552-1618), courtier, soldier, explorer, founder of colonies, and author, *b.* Hayes Barton

Farm, Budleigh, Devonshire. His family were of the gentry class, and he was related to Sir John, Sir Humphrey, and Sir Adrian Gilbert on his mother's side. His name is variously spelt; but the orthography of R. himself is 'Raleigh.' Richard Hooker and Francis Bacon both agree that he studied at Oxford, and Anthony Wood records in his *Athenae Oxonienses* that R. became a commoner of Oriel College about 1568 and that, under an excellent tutor, he was 'the ornament of the juniors and was worthily esteemed a proficient in oratory and philosophy.' In 1569, however, he went to France as a gentleman volunteer of the Huguenot army, being present at the battles of Jarnac and Montcontour. In 1577 he served under the prince of Orange in the Netherlands. On his return he joined Sir Humphrey Gilbert in the latter's expedition under a royal patent to plant settlements in N. America. Although the expedition was not successful, R.'s active interest in the field of exploration and colonisation dates from this time. When the rebellion in Ireland broke out in 1580 R. received a captain's commission under Lord Arthur Grey, lord deputy of Ireland. R.'s name is associated with the merciless massacre of the greater part of the Sp. and It. garrison of Fort del Oro at Smerwick in Kerry, where they were besieged by Grey.



SIR WALTER RALEIGH

It was on his return from Ireland that Leicester, his patron, gave him the chance to appear at court. The story of R.'s gallantry to the queen in throwing his cloak to the ground for her to walk over may indeed be true; but his first introduction to court is rather to be ascribed to Leicester. In the course of a few years he was knighted, made lord warden of the Stannaries, captain of the guard, and

lieutenant-genera of the co. of Cornwall (1587). He also received the valuable grant of the forfeited lands of the earls of Desmond and a lucrative patent for wine-vendor's licences. These marks of favour naturally exposed him to envy at court.

Meanwhile, in 1584, R. was again thinking of colonisation. He drew up a plan for colonising what is now Virginia and Carolina (he named Virginia in honour of the Virgin Queen) and laid it before the queen and her council for approval. On 26 Mar. 1584 the queen granted him letters patent 'to discover, search, find out, and view such remote heathen and barbarous lands . . . not actually possessed of any Christian prince, nor inhabited by Christian people' (Hakluyt's *Voyages*, vol. iii). On 7 April 2 vessels, fitted out at the cost of R. and of his associates, sailed round the W. Indies and Carolina, and their report induced R. vigorously to prosecute his design of planting a colony in Virginia. A fleet under R.'s cousin, Sir Richard Grenville, planted a settlement at the is. of Roanok, but mismanagement led to great distress among the settlers. By 1588 R. had spent £40,000 upon his colonial enterprises, and the experience taught him that so great a design could not be carried out by a single individual. He therefore assigned his patent to a company of merchants, reserving to himself a fifth part of the gold and silver ore raised. R. also joined in the enterprise to find the NW. Passage, the conduct of which under Capt. Davis (q.v.) resulted in the discovery of Davis Strait. A successful privateering expedition to the Azores in 1586 was carried out in pinnaces fitted out at R.'s expense. R.'s fame now extended far outside England; he was known not only as the promoter of maritime discovery and the founder of colonies, but also as a patron of science in general. Probably R. took no direct part in the fight against the Sp. Armada in 1588: he was, however, a member of the council of war which met to consider the best means for securing England's safety, and helped to draw up the final plan of defence.

R. then suggested attacking the Sp. in the W. Indies by a daring interception of the Sp. Plate fleet. R. was given a commission as general of the fleet which was to conduct this operation. In 1592 he sailed, but was overtaken by Frobisher with letters from the queen recalling him. He continued on his course, but after a storm off Cape Finisterre, which scattered the fleet, he resolved to obey the queen's orders and, returning to England, was sent to the Tower by his jealous sovereign to atone for his intrigues with the beautiful Elizabeth Throckmorton, who eventually became his wife.

During his period of exile from court he matured a project for a voyage to Guiana. It is difficult to see the motives which first induced him to take this step, but Naunton (q.v.) states that, finding his favour declining, his imagination suggested the discovery and conquest of a second empire of the Incas, which would not only invest him with the fame

that his restless ambition desired, but also restore him to favour at court and fill his exchequer from the wealth of El Dorado, in the existence of which he believed as fully as did most of his contemporaries. He therefore devised his famous voyage in search of El Dorado or Manoa, and after his return from Guiana pub. his celebrated *Discoveries of Guiana*, a narrative which still fascinates by its persuasive style, though R.'s statements about El Dorado, the tribe without heads, and other phenomena are proof of the gullibility which made him too ready to listen to the quack as well as to the genius.

Restored to the favour of the queen, he was appointed an admiral in the expeditions to Cadiz, 1596, and in the following year was engaged in an attack on the Azores, in both of which he added greatly to his reputation. The death of Elizabeth I., however, was the turning point in his fortunes. The new sovereign and his old enemies combined to bring about his downfall. In a secret correspondence with the Scottish king, before the death of Elizabeth, Sir Robert Cecil succeeded in impressing James with a belief that R. was unfavourable to his succession; James had already been prejudiced against R. by the Earl of Essex. R. was dismissed from his post as captain of the guard, and absurdly charged with complicity in the Sp. plot or Lord Cobham's treason, which planned to dispossess James of his crown, and to place his cousin, the Lady Arabella Stuart, upon the throne, with the aid of Sp. gold. R.'s trial took place in 1603. He defended himself with eloquence and force, but in vain, for Coke, the attorney-general, conducted the trial on behalf of the Crown in a manner scandalous even by the standards of the age. R. was found guilty and sentenced to death.

Although his estates were confiscated, the capital sentence was not at that time carried out, and R. spent the next 12 years in prison. During his confinement he spent much time in chemical experiments and research, but most of his intellectual energy in this period was bestowed upon the conception and composition of his *History of the World*. Reflective in matter and dignified and grave in style, this work is one of the finest specimens of Elizabethan prose and shows the finest side of R.'s character.

Eventually what impartial intercession could not effect was achieved by an appeal to the king's greed. It is probable that the idea of the existence of a great gold-mine in Guiana, from which appreciable benefits might be reaped, induced the needy James to listen eagerly to Sir George Villier's intercession, prompted by a bribe of £1500. R. was released in Mar. 1615, and at once made every preparation for his second voyage to Guiana, promising the king that he would not interfere with the Sp. settlements. Like the first, it failed of its object. He had embarked in it his remaining fortune and lost both that and his eldest son, Walter, who was among the fallen at Santo Thomé. On

R.'s return to England in 1618, a broken and dying man, the Sp. ambas. demanded his punishment for the outrage. R. met with no pity from James, who had him beheaded in Old Palace Yard, Westminster, on 29 Oct. 1618.

R. typified the spirit of his age, and his career is a vivid illustration of the different facets which made up the Elizabethan court. R. was primarily a courtier and a royal favourite. His important court connections made his voyages possible. Later ages over-emphasised R. the explorer. His achievements in this field were of less importance than those of the Cabots, and of Willoughby and Chancellor. The Victorians extolled him as the founder of empire, but his own age saw him more accurately as a spectacular favourite. He was not a good coloniser. Ideas came to him rapidly, fantastic, daring, and over-ambitious, but he lacked the staying power and capacity for organisation to bring them to fruition, and his voyages had little lasting effect on colonial hist. His enterprise was little more than greed. Like all his contemporaries, he saw colonies as a ground for immediate exploitation, and, when they yielded no gold, lost interest in them. In his attitude to Spain he was simply a splendid pirate, though, indeed, without such pirates England might well have perished. R. was a man of his time, and should be judged accordingly. Gullibility and superstition blended with a scientific thirst for knowledge and a mature philosophy. Great ideas emerged momentarily, to be lost in the constant, hectic desire to gamble all and sacrifice all for quick results; for at the court from which he derived his existence quick results were essential to maintain his position. R. never had the genuinely sentimental hold on Elizabeth which Leicester and Essex possessed, and he lacked the diplomacy and apparent servility which enabled Hatton to survive. R. played with Elizabeth's orders more than once, and lacked the sense to crawl back into favour. His outspokenness made him James's enemy, and his egotism, obvious greed, and magnificence made the court afraid of him. In the atmosphere of cut-throat competition which marked the Elizabethan and Jacobean court, R. could survive only by direct favour of the ruler, or by entering into the game of faction directed by the Cecils. He did neither, playing, after his introduction to court, a lone hand. Elizabeth tolerated him because, in her struggle with Spain, he could be useful, but R. was merely a danger to James's peace policy, and he had too much pride to maintain himself when he had outlived his usefulness. Essex could rely on some support in London, but R.'s contempt for the people robbed him of popular affection. His downfall is proof of the strength and ultimate supremacy of the court system built up by Elizabeth and Burleigh.

Of his literary accomplishments mention has already been made above. The pure and nervous style in which *The*

Discoverie of Guiana, 1596, is written gives it an enduring charm. Camden characterises it as an elegant production, and it attracted such attention when it first appeared that it was trans. into the prin. European languages. It was reprinted in Hakluyt's *Voyages* in 1598, in T. Birch's *Works of Raleigh*, 1751, in A. Cayley's *Life of Sir Walter Raleigh, Knight*, 1805, and in *The Works of Sir Walter Raleigh, Knight, now first collected, to which are prefixed the Lives of the Author by Oldys and Birch*, Oxford, 1829. A few years after the pub. of the original an abridged Lat. trans. appeared in 1599 in Nuremberg at the cost of the geographer Levinus Hulsius. A literal trans. is also contained in De Bry's *Collection of American Navigations and Voyages* which was pub. in Latin, German, and French (1590-99). The original text is reproduced in the Hakluyt Society's reprint (1848), ably ed. by Sir Robert H. Schomburgk (q.v.) with a biographical memoir. R.'s poems are largely of a philosophic cast. The authenticity of some of the poems attributed to him has been questioned. One of the finest is that beginning 'Go, Soul, the Body's Guest'; another is the poem known as 'His Pilgrimage,' and 'If all the World and Love were Young' is widely known. No collection of his poems was made in his lifetime or shortly after his death, the first collection being that of Sir Egerton Brydges (1813). Among his other prose works are *A Report of the Truth of the Fight about the Isles of the Azores* and his *Journal* of his second voyage to Guiana, printed from the original Cotton MSS. in the Brit. Museum. See lives by W. Oldys and T. Birch (see above), and by P. Fraser Tytler, 1833; W. Stobbing, 1892; M. A. S. Huono, 1898; R. Rodd, 1904; M. Waldmann, 1928 (new ed. 1943); E. Thompson, 1935. See also H. L. Stephen (ed.), *State Trials*, 1899; C. H. Firth, *Sir Walter Raleigh's History of the World*, 1919; V. T. Harlow, *Sir Walter Raleigh's Last Voyage*, 1932; I. Anthony, *Raleigh and his World*, 1934; D. B. Quinn, *Raleigh and the British Empire*, 1949; and A. L. Rowse, *The Expansion of Elizabethan England*, 1955.

Raleigh, Sir Walter Alexander (1861-1922), scholar, b. London, son of a Congregationalist minister. He was educ. at the City of London School, Edinburgh Academy, London Univ., and King's College, Cambridge, where he ed. the *Cambridge Review* and was President of the Union. After 2 years as Prof. of Eng. at Aligarh in India, he occupied the Chair of Eng. at Liverpool from 1890 to 1900, at Glasgow from 1900 to 1904, and was the first prof. of Eng. literature at Oxford, where his stimulating lectures had the same sort of inspiring influence as those of Quiller-Couch (q.v.) at Cambridge. In 1911 he was knighted, and after the First World War he was appointed official historian of the Royal Air Force, but lived so complete only the first vol., pub. in 1922. His books are comparatively few. They include *The English Novel*, 1894,

Robert Louis Stevenson, 1895, *Style*, 1897, *Milton*, 1900, *Wordsworth*, 1903, *Shakespeare*, 1907, and *Six Essays on Johnson*, 1910. After his death a collection of his lighter writings was made by his son with the title *Laughter from a Cloud*, 1923, and his *Letters* were ed. by his wife in 1926. See lives by R. W. Chapman, 1922, and V. Crum, 1923.

Raleigh, cap. of N. Carolina, U.S.A., and also of Wake co. A cultural, trade, and distribution centre, it has iron foundries, cotton and hosiery mills, railroad shops, overall factories, office and school furniture factories, fertiliser factories, and an important tobacco market. R. has the state college of agriculture and engineering, Meredith College, Shaw Univ., and other educational institutions. Pop. 65,679.

Râles, sounds heard over the chest during the act of breathing and indicating some abnormal condition of the respiratory organs. Dry R. are caused by the narrowing of the bronchial tubes owing to the presence of secretion. Moist R. are bubbling or crackling sounds, caused by the air passing through fluid in the bronchioles.

Rallidae, see RAIL.

Ralph, James (c. 1695-1762), Amer. author, b. probably Philadelphia. He became acquainted with Benjamin Franklin, whom he accompanied to England. He was first a schoolmaster in Berkshire, and then moved to London, where he became a hack-writer. In 1728 he pub. *The Touchstone, or an Essay on the Reigning Diversions of the Town*, and a poem entitled *Night*, dedicated to the Earl of Chesterfield; in the same year he attacked Pope's *Dunciad* in a scurrilous satire called *Sauney*. His ballad opera, *The Fashionable Lady*, 1730, was the first play by an Amer. to be produced in London. His most ambitious work was *A History of England during the Reigns of King William, Queen Anne, and George I*, 1744-6.

Ram, see PUMPS.

Ram, in ant times a weapon fitted to a ship's bow in order to sink an enemy's ship when driven into it. Modern warships have also been constructed with prows for ramming, made of great strength and projecting below the water-line. In warfare the R. was given an exaggerated importance, owing to the ease with which the *Merrimac* destroyed some Federal vessels in 1862. In recent times the bow of every battleship constituted a R., but expert opinion held that the use of it was inadvisable and as dangerous to the rammer as to the rammed. There have been some serious naval mishaps by accidental ramming; the sinking of the *Vanguard* by the *Iron Duke* in 1875, the ramming of the *Grosser Kurfürst* by the *Kaiser Wilhelm* in 1878, and the sinking of the *Victoria* by the *Camperdown* in 1893 may be mentioned. Submarines have been sunk by ramming, by both merchant ships and warships, in both world wars.

Ram, The, see ARIES.

Ram Mohan Roy, Raja, sometimes **Rammohan Roy**, see BRAHMO SAMAJ.

Râma, in Hindu mythology, the hero of the great Sanskrit epic, the *Râmâyana* (q.v.), the Râma-Chandra, or seventh incarnation of Vishnu. See RÂMÂYANA.

Ramadan, ninth month of the Muslim year: one night in it is the night of Destiny, when the fates of men for the coming year are fixed; popular opinion favours the 27th as the great night. It is the month of fasting: believers must abstain from food, drink, perfume, smoking, and sexual intercourse from a little before sunrise till sunset; special services are held during the night. Those who can, rest during the day and make the most of the night. Travellers, the sick, women with child, and young children need not fast, though they should fast an equal number of days when their disability has passed.

Ramade, tn of Iraq, 59 m. NW. of Bagdad, on the Euphrates. It is the starting point of the motor route across the desert to Damascus.

Ramah, name of sev. places in Palestine, of which 2 (which may be identical) are important: (1) City of Benjamin, the traditional site of Rachel's tomb, just outside Bethlehem; (2) bp. of Saul.

Raman Effect. When monochromatic light passes through a transparent medium the emergent beam consists of a mixture of light of the same wave-length as the incident beam, together with a small amount of scattered light of longer wave-length. This fact was first discovered in 1928 by the Indian physicist, Sir V. C. Raman, and is known as the R. E. It is not to be confused with the familiar phenomenon of fluorescence (q.v.), in which the wave-length of the emergent beam depends only on the nature of the fluorescent substance, not on the wave-length of the incident beam. In the R. E. the change of wave-length produced by the scattering of the light varies with the wave-length of the incident light. The effect is explained by the quantum theory (q.v.) of light as being due to a loss of energy of the incident light quantum. The lost energy reappears as molecular energy of the scattering medium. The R. E. may be compared and contrasted with the Compton Effect (q.v.), where the scattering of hard X-rays by media of light atomic weight results in an increase of the wave-length of the emergent beam, but the loss of energy of the X-ray quantum reappears as the kinetic energy of an electron knocked out of an atom of the scattering substance. The differences between the frequencies of the incident and scattered light is known as the Raman shift. The energy changes of the scattered light correspond to energy changes in the vibrational energies in solids and liquids and in the rotation and rotation-vibration energies in gases. Molecules can absorb infra-red radiation if a change in dipole moment can occur. The R. E. depends upon changes in polarisability. Thus H₂ and O₂, which are symmetrical molecules, cannot absorb infra-red but do show the R. E. However, the number of possibilities is large, and no simple

relations can be given for polyatomic molecules. Nevertheless, it is possible to use infra-red and Raman spectra together for analytical purposes. The R. E. has proved very useful in the solution of many analytical problems, especially in the detection of different bonds in mols. which have more or less a definite Raman frequency. Benzene, toluene, and the xylenes shown Raman frequencies characteristic of aliphatic and aromatic compounds, so that these compounds have aliphatic and aromatic C-H groupings. Distinction between *cis*- and *trans*-isomers is possible, since the latter are more symmetrical and give fewer spectral lines. Nitrates and dilute HNO_3 give a single Raman line due to the NO_3 ion, whilst nitrites and conc. HNO_3 give a line due to the NO_2 group, these results for HNO_3 agreeing with those obtained in nitration reactions. No characteristic line associated with the ions of SO_4 , SeO_4 , and ClO_4 has been found in tellurates, so that the existence of the TeO_4 ion is unlikely. This confirms the conclusion reached on chemical grounds that telluric acid is not $\text{H}_2\text{TeO}_4 \cdot 2\text{H}_2\text{O}$ but $\text{Te}(\text{OH})_6$.

Ramanuja (d. c. 1137), Brahmin, founder of the Vaishnava sect, b. Perambur, near Madras. He was buried in the great temple of Shriranganath. He maintained the personal existence of a supreme deity.

Rāmāyana, one of the 2 great Sanskrit epics of ant. India, the other being the *Mahābhārata* (q.v.). The R. is believed to be the older of the 2, and is the shorter; it differs from the *Mahābhārata* in that it is apparently the work of a single mind, and not a compilation. It is attributed to Vālmiki, who seems, at any rate, to have been a real personage. The date of composition of R. is uncertain: the geographical, political, and social outlook of the poem suggest the 5th cent. BC, but the general regularity of language and metre, and other facts, make it seem probable that the great poet who gave to R. its present form belonged to the 2nd cent. BC. A complete ed. of the older text was pub. at Madras in 1856, trans. into Eng. verse (1870-5) by R. T. H. Griffith and R. Dutt in Everyman's Library and Temple Classics. The poem is held to typify the expansion of Hindu influence over the S. of India, although it seems a product of E. Hindustan. R. celebrates the deeds of a certain king and his 4 sons and contains 24,000 couplets. The central figure is Rāma-Chandra, a prince of the kingdom of Ayodhyā (Oudh). He wanders over the S. parts of India, and his wife Sītā is captured by Rāvana, a giant who rules over Ceylon. With the aid of Vibishana, a brother of Rāvana, and Sugriva, king of the monkeys, Rāma conquers Ceylon, and recovers his wife Sītā. Finally, he is restored to the throne of his ancestors in Ayodhyā. There are sev. Rāmas in Sanskrit literature; Chandra, the surname of the hero of the R., signifies the moon. See also **SANSKRIT LANGUAGE AND LITERATURE**.

Ramazzini, Bernardino (1633-1714), It. physician and philosopher, b. Carpi. He graduated in philosophy and medicine at Parma Univ. in 1659. R. was appointed prof. of theoretical medicine at Modena, 1682, moving to Padua as professor of practical medicine in 1700. He wrote about 20 books, the most famous being *De Morbis Artificum Diatriba*, 1700, which was the first systematic treatise on occupational diseases and the first history of industrial medicine and hygiene. It deals with the diseases of 52 occupations, including pneumoconiosis and other miners' diseases, lead poisoning in potters, silicosis in stone masons, diseases of metal workers, etc. It was trans. into Eng. in 1705 and in 1940 (W. C. Wright). See life by F. Koelsch, 1912.

Rambert, Marie, founder and director of the Ballet Rambert, b. Warsaw. A pupil of Dalcroze, she was engaged by Diaghilev as a teacher of eurythmics. Since 1920 she has been one of the prin. architects of Eng. ballet. Having studied under Cecchetti, she was one of the founders of the Cecchetti Society. In 1930 she launched the Ballet Club, later to become the Ballet Rambert, and under her direction many famous Eng. choreographers, including Ashton, Tudor, and Andrée Howard, gained early and invaluable experience, and such dancers as Pearl Argyle, Maude Lloyd, and Sally Gilmour have made their name. She was awarded the C.B.E. in 1953 for her services to Eng. ballet. See L. Bradley, *Sixteen Years of Ballet Rambert*, 1946.

Rambouillet, Catherine de Vivonne, Marquise de (1588-1665), b. Rome, her father being Fr. ambas. there. In 1600 she married Charles d'Angennes, who became marquis of R. in 1611. About 1615 she started her famous *salon* at the Hôtel de R., to which all the greatest and most brilliant men in Paris flocked, and where were found also her successors in the literary *salon*, Mlle de Scudéry and Mme de Sévigné (qq.v.). Regular meetings were held, where literature, language, and philosophy were discussed. Her influence, which was decisive from about 1617 to 1645, was all for the refinement which degenerated in her successors into *préciosité*.

Rambouillet, Fr. tn. cap. of an arron., in the dept of Seine-et-Oise, at the S. end of the great forest of R. There is a 14th-18th-cent. château with beautiful parks, once a royal demesne, now the summer residence of the President of the Republic. Charles X (q.v.) signed his abdication here. Pop. 7400.

Rameau, Jean Philippe (1683-1764), Fr. composer, b. Dijon, pupil of his father, an organist. He visited Paris in 1705-8, then became organist at Dijon and afterwards at Clermont-Ferrand cathedral. At last he estab. himself permanently in Paris as teacher and composer, beginning to make his mark in the theatre only at the age of 40. He wrote nearly 40 operas, opera-ballets and similar stage works, a few motets and cantatas, sev. sets of concertos for chamber music, and espec-

ally a large number of harpsichord pieces that rank with Couperin's in quality. He was also a famous theorist, publishing a *Traité* and *Nouvelles Réflexions* on harmony, and originating the idea of the 'fundamental bass.' See studies by L. de la Laurencie, 1908; L. Laloy, 1908; J. Gardien, 1949; C. Girardstone, 1957; also P. Masson, *L'Opéra de Rameau*, 1930.

Ramée, Louise de la, see OUIDA.

Ramée, Pierre de la, see RAMUS.

Ramenghi, Bartolommeo. See BAGNA-CAVALLO.

Rameses, name of sev. kings of anct Egypt. *Rameses I*, the founder of the 19th dynasty, lived about 1320 BC; he reigned only 2 years, and those were spent in severe fighting. *Rameses II* (Osymandias), 1298-1232, one of the most famous of Egyptian kings, the third of the 19th dynasty, was the son of Seti I. He followed up the work begun by Seti I, and erected many monuments, his greatest achievements in architecture being the excavation of the rock temple of Abu-Simbel and the completion of the great hall of Karnak. He also built the Ramesseum and enlarged and adorned the temple of Tanis, which contained a colossal figure (92 ft high) of himself standing erect and crowned, sculptured in red granite. Early in his reign he provoked and fought a long war against the Hittites. The great battle of Kadesh, in which the issue was decided by his own personal courage, is illustrated in his temples and celebrated in the epic poem of Pentaur. This war left Egypt impoverished and suffering from an incurable decline. *Rameses III* (1198-1166 BC), second king of the 20th dynasty, was famous for his great victory over the confederation of people from Crete, Cyprus, Philistia, and the N. Mediterranean, who combined with the Libyans and attacked Egypt by land and sea. R. won the great naval battle near Pelusium, and also defeated the land force. Eight other kings of the name of R. followed Rameses III; they were all unimportant, and in the hands of the priests of Amen. See EGYPT, History.

Rameswaram, tn and state and is. of India, in Madras, 92 m. SE. of Madura, between the Gulf of Manaar and Palk Strait. The great temple at R. is one of the most venerated in S. India, and is a magnificent building. Tradition attributes its foundation to Rama himself.

Ramie, or China Grass, see BOEHMERIA.

Ramillies, vil. in the prov. of Brabant, Belgium, 29 m. SE. of Brussels. It was the scene of Marlborough's great victory over the Fr. in 1706.

Ramle ('the Sandy'), Israel, 12 m. SE. of Tel-Aviv. Founded in 716 by the Ommayyads, it was taken by the crusaders in 1187, and became the headquarters of Richard Coeur de Lion. Its famous tower (the 'Tower of the Forty Martyrs') is of Muslim origin, and dates from the 14th cent. This tower was the minaret of a large mosque originally built by Khalif Suleiman, the founder of the tn. Before its capture by the Israeli army in

July 1948 R. was mainly an Arab tn, but most of the Arabs fled. Pop. 21,000.

Ramón y Cajal, Santiago (1852-1934), Sp. histologist and neurologist, b. Petilla de Aragon. He was prof. of histology and



B.O.A.C.

THE COLOSSUS OF RAMESES, CAIRO, EGYPT

pathological anatomy at the univ. of Madrid. R. y C. made fundamental discoveries on the origin and termination of olfactory nerve fibres, on the cerebral cortex, on the structure of sensory ganglia in man and animals, on the retina,

and on the regeneration of nerve. His treatise in 3 vols., *Histologia del Sistema Nervioso del Hombre y de los Vertebrados* (Histology of the Nervous System, in Man and Vertebrates), was pub. from 1897 to 1904 (Eng. trans., 1933). In 1906 he shared (with C. Golgi) the Nobel prize for medicine for his work on the histology of the nervous system. The horizontal cells of C. in the cerebral cortex, the olfactory area of C., the nucleus of C. (commissural nucleus), and various staining methods are named after him. See *Explorer of the Human Brain*, by D. F. Cannon, 1949, and *Don Quixote of the Microscope*, by H. Williams, 1954.

Ramos, João de Deus Nogueira, see DEUS NOGUEIRA RAMOS, JOÃO DE.

Rampart, see BASTION; FORTIFICATION.

Ramphastidae, see TOUCANS.

Rampion, or *Campanula rapunculus*, biennial plant (family Campanulaceae), with long white radish-like roots which with the leaves are occasionally grown and used as a winter salad. The plant is a native of Britain, and bears small, pale-blue flowers. The Round-headed It. is *Phyteuma tenerium*, and the Spiked It., *P. spicatum*, of the same family.

Rampolla del Tindaro, Mariano (1843-1913), It. cardinal and papal secretary of state, b. Polizzi, Sicily. He was sent by Pope Pius IX to Madrid in 1875, as counsellor of the papal nuncio. In 1880 he was appointed secretary of eccles. affairs, and in 1882 nuncio at Madrid; and it was his intervention with the Pope which settled the question of the Caroline Is. between Germany and Spain. Pope Leo XIII made him cardinal and secretary of state in 1887. He resigned the latter office, 1903. He would have succeeded Leo XIII as Pope but for the opposition of Austria. See life by M. Claar, 1929.

Rampur, tn of Uttar Pradesh State, India, 40 m. NW. of Bareilly, formerly cap. of It. State. The State Library contains a notable collection of oriental MSS. and portraits.

Ramree Island, Burma, in the Bay of Bengal, separated from the mainland by tidal flats and is, at the mouth of the R. An, 50 m. long, 15 m. wide. Salt and oil are found; Kyaukupyu is the chief centre.

Ramsay, Allan (1686-1758), poet, b. Leadhills, Lanarkshire. He settled in Edinburgh as a wig-maker, and soon had a business from which he derived a comfortable living. In the year he married (1712) he joined the Jacobite 'Easy Club,' to the members of which he read poetry of his own composition. He then began to print his verses on single sheets, and found that there was a demand for them. About 1716 he became a bookseller, and began to publish his own writings. *Fables and Tales* and *A Tale of Three Bonnets*, a political allegory, appeared in 1722, *The Tea-table Miscellany* in 1724-7, and the pastoral drama, *The Gentle Shepherd*, in 1725. After 1730 R. ceased to write. He ed. *The Evergreen*, a collection of old Scots poems, in 1724, thus making the works of Dunbar, Henryson, and others available to later

writers. He wrote much that was charming if nothing that was great, and such pieces as 'Bessy Bell' and 'Farewell to Lochaber' are in the authentic tradition of Scottish lyric verse. His *Poetical Works* were ed. by G. Chalmers in 2 vols., 1800. See lives by W. H. O. Smeaton, 1896, and B. Martin, 1931.



ALLAN RAMSAY, THE POET

Ramsay, Allan (1713-1784), painter, b. Edinburgh, the eldest son of the poet, practised as a portrait painter in Edinburgh until about 1758, when he settled in London. Alexander Nasmyth was one of his pupils. He painted many well-known people, was a favourite of George III, who sat for him, and one of the Johnsonian circle. He excelled in portraits of women.

Ramsay, Sir Andrew Crombie (1814-91), geologist, b. Glasgow. His geological map of Arran attracted attention at the Brit. Association meeting in Glasgow, and led to his joining the Geological Survey in 1841, of which he became Director-General in 1872. During his service he surveyed many areas in the U.K., notably in Wales, where he was specially interested in the action of glaciers. One of the first to maintain glacial origin of the drift. Appointed prof. of geology at University College, London in 1848, and at the Royal School of Mines in 1851; continued Survey appointments concurrently. President of Geological Society 1862-4; Knighted 1881. F.R.S. 1862. Royal Medallist 1880. Among his works are *Old Glaciers of Switzerland and North Wales*, 1860, *Red Rocks of England*, 1871, *The River Courses*

of England and Wales, 1872, and *Physical Geography of Great Britain* (6th ed.), 1894. Ramsay, Andrew Michael (1686-1743), writer and theologian, generally known as the Chevalier R., b. Ayr and educ. at Edinburgh. He went to France and formed the acquaintance of Fénelon, Archbishop of Cambrai, who converted him to Rom. Catholicism. He became tutor to the Duke of Château-Thierry and afterwards to the Prince of Turenne; and his reputation induced the Pretender, in 1724, to invite him to Rome, and to entrust him with the education of his children. The next year he revisited Scotland, where he remained some time, employed in literary labour. On visiting England he obtained the degree of doctor of civil law at Oxford, and was admitted a member of the Royal Society of London. After his return to France he was appointed intendant to the Prince of Turenne, and he held this post till his death, which took place at St Germain-en-Laye. The writings of the Chevalier R. are more remarkable for purity of style than for depth or originality of thought. As a theologian he was visionary in the extreme, and even his orthodoxy is open to suspicion. His best-known works are *The Life of F. de Salignac de la Motte Fénelon*, 1723, and *The Travels of Cyrus* (3rd ed.), 1728, an imitation of the *Télémaque* of Fénelon.

Ramsay, Arthur Michael (1904-), prelate, educ. at Repton and Magdalene College, Cambridge; Canon of Durham and prof. of divinity in Durham Univ., 1940-50; regius prof. of divinity at Cambridge 1950-2; appointed Bishop of Durham in 1952. He became Archbishop of York in 1956. Amongst his publications are *The Gospel and the Catholic Church*, 1936, *The Resurrection of Christ*, 1944, *The Glory of God and the Transfiguration of Christ*, 1949, *F. D. Maurice and the Conflicts of Modern Theology*, 1951.

Ramsay, Charlotte, see LENNOX.

Ramsay, Edward Bannerman Burnett (1793-1872), minister and author, b. Aberdeen and educ. at the grammar school, Durham, and St John's College, Cambridge. In 1846 he became dean of Edinburgh. He was the founder of the Scottish Episcopal Church Society, which later became the Representative Church Council. His best-known book is his *Reminiscences of Scottish Life and Character*, 1858, which ran into 21 successive eds. during his lifetime, and is one of the best collections of Scottish anecdotes in existence.

Ramsay, Sir William (1852-1916), chemist, b. Glasgow, only son of Wm R., C.E., and nephew of Sir Andrew Crombie R., the geologist. He attended Glasgow Academy, then Glasgow Univ. till he was 18, and then went to Germany, to study chem. under Bunsen at Heidelberg and under Fittig at Tübingen. Returning to Glasgow in 1872, he became tutorial assistant of chem., Glasgow Univ., 1874-80; prof. of chem. in Univ. College, Bristol, 1880; principal in 1881; prof. of

chem. in Univ. College, London, 1887-1913; and later prof. emeritus. He was early occupied in research in organic chem., but turned his attention to the physical side of chem., carrying out, while in Bristol, refined experiments on evaporation and dissociation in collaboration with Sydney Young. From this he pursued investigations into the molecular surface energy of liquids. After the discovery, by Lord Rayleigh, of the minute difference in density between atmospheric nitrogen and that prepared chemically, R., who had made the same discovery by different means, joined Rayleigh in research that resulted in the discovery of argon, a markedly inactive gaseous constituent of the atmosphere. This discovery they jointly announced to the Brit. Association at Oxford, 1894. R. then investigated the inert gas contained in certain minerals, and in one (uraninite) he found helium, already spectroscopically discovered in the sun. Xenon, krypton, and neon, similarly inactive gases and present as traces in the atmosphere, were in turn discovered. In conjunction with Soddy, Collie, Cameron, Gray, and Hays, he carried on much research into radium emanation, and discovered that helium is a product of its disintegration. He was made a fellow of the Royal Society in 1888; K.C.B., 1902; and was awarded the Nobel prize in chem. in 1904.

Works, beyond those communicated to the Royal Society, Chemical Society, etc., include *System of Inorganic Chemistry*, 1891, *The Gases of the Atmosphere* (the hist. of their discovery), 1896, *Modern Chemistry, Systematic and Theoretical*, 2 vols., 1901, 1907, *Essays Biographical and Chemical*, 1908, *Elements and Electrons*, 1912. He was engaged in chemical work in connection with the First World War when he d., his fatal illness having been accentuated by his unsparing efforts in scientific work during the War. See life by Sir W. A. Tilden, 1918.

Ramsay, Sir William Mitchell (1851-1939), archaeologist: b. Glasgow and educ. at the univs. of Aberdeen, Oxford, and Göttingen. In 1882 he was made a fellow of Exeter College, Oxford; in 1885 prof. of classical art at Oxford; and in the following year prof. of humanity at Aberdeen Univ. He travelled much in Asia Minor, and was one of the foremost authorities on the Holy Land and the early Rom. Empire. Among his works are *The Historical Geography of Asia Minor*, 1890, *The Church in the Roman Empire*, 1893, *St Paul the Traveller and the Roman Citizen*, 1895, *Studies in the History and Art of the Eastern Province of the Roman Empire*, 1906, *The First Christian Century*, 1911, and *Asiatic Elements in Greek Civilisation*, 1927.

Ramsbottom, urb. dist. of Lancs, England, on the Irwell, 13 m. N. of Manchester. There are a number of industries, the chief being calico printing and bleaching, cotton-spinning and weaving, and paper making. Pop. 15,000.

Ramsey: 1. Seaport and popular holiday resort of the Isle of Man, on the NE.

coast 14 m. NNE. of Douglas. The riv. Sulby runs through the tn and forms a harbour. R. exports farm produce. Pop. 4607.

2. Urb. dist. and small tn of Hunts, England, on the edge of the Fens, 11 m. NNE. of Huntingdon. Successive fires have destroyed nearly all trace of its antiquity. It owes its importance to the foundation of a Benedictine abbey here in 969 by Duke Ailwyn, 'Alderman of all England.' The remains of the buildings are not extensive. The 13th-cent. Lady Chapel, projecting eastwards from the site of the N. transept, is now the grammar school. It was converted into a house after the dissolution. There are the remains of a very fine 15th-cent. gatehouse, and the 12th-cent. par. church was originally a guest-house or hospital attached to the monastery. Pop. 5684.

Ramsey Is., in St George's Channel, 1 m. off the W. coast of Pembrokeshire, Wales. R. abounds in wild life, particularly sea-birds and seals.

Ramsgate, municipal bor. and popular seaside resort of Kent, England, situated on the SE. corner of the Is. of Thanet, between the N. and S. Forelands. It is 4 m. S. of Margate and about 72 m. by road from London. The tower of St George's Church serves as a landmark for ships passing through the Downs. There are sev. other churches and colleges, including a Benedictine abbey and school, a synagogue, and Townley Castle, a Jewish college; here is St Lawrence College, a boys' public school, and grammar, secondary, and primary schools. The harbour is noted as a yachting centre and meeting-place for light cruising craft.

A primitive settlement is said to have once existed on the slopes leading to the sea, and many traces of Rom. occupation have been found in the bor. In about AD 449 the armies of Hengist and Horsa landed at Ebbsfleet (*Ebbs Fleet*), then a notable port, and in AD 597 St Augustine landed there. The original par. church of R., built about 1 m. from the coast, was commenced in 1064 and dedicated to St Lawrence, who accompanied St Augustine on his pilgrimage through Gaul and subsequently landed in Britain with him. About this church the first permanent settlement sprang up, and gradually extended to the sea. Albion House was once the residence of the Duchess of Kent, and later of Queen Victoria, her daughter. The Obelisk at the entrance to the E. pier commemorates the return of George IV from Hanover in 1821. The construction of the harbour was commenced in 1749-50, and completed in 1793 at a cost of £750,000, Smeaton being the engineer. A fishing-fleet gradually came into existence, but many vessels were lost in the First World War and not replaced. Pop. 35,800.

Ramus, Peter (Pierre de la Ramée) (1515-72), Fr. philosopher, humanist, and mathematician, b. Picardy. His parents were extremely poor, and R. ran away to Paris, and at last entered the Collège

de Navarre as a servant. When he presented himself for his degree he undertook as an exercise the task of showing that Aristotle was not infallible. This was the beginning of the anti-Aristotelian opinions by which R. gained his fame. In 1543 he pub. his new system of logic, with strictures on the logic of Aristotle. The king ordered his works to be suppressed, and forbade his teaching or writing against Aristotle on pain of corporal punishment. R. availed himself of his leisure to prepare an ed. of Euclid. In 1551 he was appointed prof. of philosophy and eloquence in the Collège de France. During the next ten years he pub. a Gk., a Lat., and a Fr. grammar, and sev. treatises on mathematics, logic, and rhetoric. R., who had embraced Protestantism, brought trouble upon himself by the zeal with which he advocated the new doctrines. He was driven from Paris sev. times, and in 1568 he went to Germany and gave lectures on mathematics at Heidelberg, where he made public profession of Protestantism. Shortly after his return to Paris he fell a victim in the massacre of St Bartholomew. Although R. had many merits as a philosopher, he was wanting in depth and caution, and his strictures on Aristotle are by no means just. He had many followers in France, England, and particularly Scotland.

Ramuz, Charles Ferdinand (1878-1947), Swiss author, b. Cully, Vaud, and lived there for most of his life. A poet of great power and virtuosity and a most distinguished novelist, he brought Switzerland once more into the forefront of Fr. literature. His poems are fresh, original, and musical, eliciting no conscious effort on the part of the reader. An epic and lyrical writer, he is equally at home in scenic description or moral conflicts. His novels show a contemplative and poetic spirit, though they no doubt have a more intimate appeal for his fellow countrymen than for foreigners. His criticism, however, is informed by a philosophical and intellectual range which must appeal to all who appreciate Fr. critical intelligence. His works include *Aline*, 1907; *Aimé Pache, peintre vaudois*, 1914; *Besoin de grandeur*, 1937; *Paris, notes d'un Vaudois*, 1938; *Découverte du monde*, 1939. His *Oeuvres Complètes* were pub. in 20 vols., 1940-1. See his *Journal*, 1896-1942, 1943, and 1942-1947, 1949. See also E. Buzenod, C. F. Ramuz, 1928; P. Kohler, *L'Art de C. F. Ramuz*, 1929; A. Tissot, C. F. Ramuz ou le drame de la poésie, 1947.

Rana, see *Frogs*.

Rancagua, tn of Central Chile, cap. of O'Higgins prov., 160 m. SE. from Valparaíso and 50 m. S. from Santiago. On the R. Cachapoal, it is an agric. centre, and also serves the Teniente mining area. There are thermal springs in the vicinity. The battle fought in the streets in 1814 is its chief title to fame. Pop. 29,440.

Rancé, Dominique Armand Jean Le Bouthillier de (1626-1700), founder of the

reformed Cistercian order of La Trappe (see TRAPPISTS), was b. of noble parents in Paris. Through the favour of Cardinal Richelieu he became canon of Notre Dame and prior of Boulogne. He was a favourite of Cardinal Mazarin, and lived a gay life at court, but in 1662 resigned all his preferments, and retired to the abbey of La Trappe in Normandy, where he instituted the rigid discipline which distinguishes the order. He pub. an ed. of Anacreon with notes, 1639, *Conduite chrétienne*, 1697, and other religious treatises. See H. Bremond, *L'Abbé trappiste*, 1929, and study by A. Cherel, 1930.

Ranch, or **Range**, name given to the vast areas over which sheep and cattle are grazed in the U.S.A. It is only in the W. that ranching is carried on, Texas, Kansas, Arizona, Colorado, Montana, Idaho, Arkansas, and New Mexico being the prin. states engaged. Cattle are kept in larger quantities than sheep, and that wild and picturesque figure, the cowboy, in his fringed 'chaps,' sombrero, and revolvers, mounted on a bucking bronco, has become a familiar figure to Brit. cinema audiences. The Amer. R.s are suffering from the effects of having been overstocked, and from the encroachment of cultivated land. The N. Amer. R.s have their parallel in the *estancias* of S. America, in Uruguay and the Argentine, and in the sheep 'stations' of Australia.

Ranchi, tn of Bihar State, India, formerly the hot-weather seat of the provincial gov. There are a number of Christian missions of different denominations.

Rand, usual name of the goldmining dist., situated on the Witwatersrand ridge, extending for about 120 m. at a distance of about 30 m. S. of Pretoria, Transvaal. The ridge forms the watershed between the Orange and the Limpopo; the word 'R.' is a Dutch word meaning 'edge,' often used in S. Africa to describe a low range of hills. There has been much dispute over the question of the discovery of gold on the R., and recently a committee was appointed by the Commission for the Preservation of National and Historical Monuments to inquire into the facts. Summarised, the committee's findings were that one, Peter Jacob Marais, who had been a prospector in California and Australia, was the first person to find gold near the Witwatersrand. This was on 8 Dec. 1853 in the Jukskei R. Further, that the 2 brothers H. W. and F. P. T. Struben, by their extensive prospecting and mining activities on the Witwatersrand, both N. and S. of the Main Reef Group of Conglomerates, from 1884 to 1886, attracted so much attention to this area that the subsequent discovery of the main reef became inevitable. The Strubens therefore made the greatest individual contribution to the discovery of the Witwatersrand goldfields. The Main Reef Group of Conglomerates was first found on G. C. Oosthuizen's part of the farm of Langlaagte shortly before the end of

Mar. 1886. This led directly to the prospecting contract of 12 April 1886. The find, which was accidental, was made by George Walker, probably in association with George Harrison but there is no record of either of these men having had assays made or milling done on the conglomerate, on which they subsequently pegged contract discoverers' claims. The Strubens were among the few pioneer discoverers, perhaps the only 2, who profited by their discoveries; they were the original owners of the Crown mines, which became the largest goldmine in the world.

The dist. having been made a public goldfield in 1886, the mining camp, at what appeared to be the richest point of the reef, sprang up on the bare veld. This was the site of Johannesburg. In a few years the representatives of the great financial interests had found their way to the new city. Lionel Phillips arrived on the R. in 1889. He was followed by others of his compatriots, notably Samuel Marks and Isaac Lewis, who were pioneers of manufacturing industry in the Transvaal. In an incredibly short time the corrugated-iron sheds, which had theretofore encumbered the building lots of Johannesburg, began to give place to palatial buildings of marble and stucco. In 1899 the output of the goldfields was over 4,000,000 oz. and in 1904 over 3,500,000. In the latter year Chinese labour was introduced for mining purposes under an ordinance, with restrictive conditions, but in Dec. 1905 the granting of permits for their importation was stopped. Johannesburg remains the centre of the lt. dist. but 'reef tns,' which were once mere suburbs of Johannesburg, have now become flourishing, independent tns, and 4 of them, Germiston, Benoni, Springs, and Krugersdorp, are among the first 12 tns of the union. The largest refinery in the world was commenced in 1920 at Germiston, and during the year ending Sept. 1954 received 14,516,972 oz of bullion which contained 12,844,349 oz of gold and 1,259,617 oz of silver. Prior to the building of this refinery all the R. gold was sent to England. After Johannesburg (named after the state secretary of the Transvaal Republic) is the oldest township on the R. Its importance was due to the discovery there, in 1888, of coal, which obviated the long haul from Natal and gave the gold-mining industry all the coal for power it needed. It was here that Montague White, mining commissioner for Boksburg goldfields, in 1888 constructed a lake and planted round it 40,000 trees, a veritable oasis in an otherwise ugly mine-scarred region. But the garden tn of the reef is Benoni, with its gardens, avenues, parks, trees, and flowers, the work of Sir George Farrar. Within a 5-m. radius of Benoni are mines that produce nearly one-half of the lt.'s gold output, and contribute more than £5m. to the national revenue. Brakpan, another reef tn, was but bare veld 50 years ago, and was first laid out as a township in 1912 as part of Benoni. But the

in which has developed still more rapidly is Springs, 6 m. beyond Brakpan. Its hist. goes back to 1883, and Ger. settlers seem to have played a big part in its settlement. Its site was noted for prodigal supplies of water and also for coal. The above are tns of the E. R. The tns of the W. R. include Langlaagte, Florida, Roodepoort, Randfontein, and Krugersdorp. At Langlaagte may be seen the homestead formerly occupied by the Oosthuizen, on which, as indicated above, gold and subsequently the reef were first discovered. The first of the large-scale exploiters was J. B. Robinson (later

settlement was well understood by Cecil Rhodes, and utilised to promote the opening up of the tropical land N. of Cape Colony and the Transvaal.

The ore from which the R. gold is extracted is a conglomerate known as banket. Some mines go to a depth of nearly 10,000 ft. The gold mines are a rapidly wasting asset, and they will probably cease to contribute materially towards the revenue of S. Africa after no great number of years, but in Oct. 1932 geologists, using the new methods of magnetic measurement, were able to announce that they had traced the westward extension of the main reef in



BENONI: MAIN STREET

South African Railways

knighthood), who purchased land to the W. of Randfontein for £26,000, which eventually was worth £18m. After him came Rhodes, Beit, and Barnato. Rhodes is said to have received between £300,000 and £400,000 a year from the goldfields after they had been in existence only 10 years. In the long run the gold mines have probably harmed agriculture by offering higher returns for transport driving and attracting young men away from the land. The immediate effect, however, was to provide new markets for agric. products, and to link up the outlying dists. by railway connection with the R. The mining industry has, moreover, supported a higher standard of living throughout S. Africa, whilst the accumulation of wealth has made possible the endowment of univs. The intimate connection between the mining of mineral wealth and the development of European

this new area some 40 m. beyond its previously known limit. The value of the reef in this new area was tested by the sinking of boreholes and has given good results in the Orange Free State. A new lease of life for some mines has been assured owing to the yield of uranium, which is recovered from the finely crushed ore after the gold has been extracted.

See W. Macdonald, *Romance of the Golden Rand*, 1933; A. Macmillan, *Environ of the Golden City and Pretoria*, 1936; and F. Brett Young's novel, *The City of Gold*, 1939.

'Rand Daily Mail,' largest S. African daily morning newspaper, estab. 1902 with Edgar Wallace as editor, widely distributed, with its main circulation in Witwatersrand and the Free State Goldfields. Its policy is independent, directed towards the furtherance of unity between the two S. African European groups

within the Commonwealth. Associated newspapers are *Sunday Times* (Johannesburg) and *Sunday Express*.

Randall, James Ryder (1830-1908), Amer. writer, b. Baltimore. He began life as a journalist, and during the civil war in America turned his attention to composing the words for popular songs, among them being *Maryland, My Maryland*, which became the *Marseillaise* of the Confederates.

Randazzo, tn in Sicily (q.v.), situated 2474 ft above sea-level, near the NW. foot of Mt Etna (q.v.), 26 m. NNW. of Catania (q.v.). It has anet walls, an old palace, and sev. beautiful medieval churches. There was severe damage during the Second World War. Pop. 15,000.

Randers: 1. Amt in E. Jutland, Denmark; it includes the is. of Anholt in the Kattegat. Agriculture and dairy farming are mainly carried on. Area 950 sq. m.; pop. 170,800.

2. Cap. of the above, on the R. Gudenaas. It possesses a medieval monastery, and there are iron foundries, manufs. of gloves, railway carriage works, and distilleries; dairy produce is exported. Pop. 41,720.

Randfontein, tn in the Transvaal, S. Africa, 28 m. from Johannesburg. It is one of the Rand (q.v.) 'gold towns'; there are some old-estab. mines near by and sev. new ones in the area. A uranium plant is also in operation. Pop.: whites, 15,000; Bantu, 21,072; coloureds, 800; Asiatics, 52.

Randolph, Edmund (1753-1813), Amer. statesman, b. Williamsburg, Virginia, educ. at Wm and Mary College, and admitted to the Bar in 1776. Although his father adhered to the Brit. cause, the son ran away and served in the Amer. Army throughout the War of Independence. He sat in the Federal Constitutional Convention, and furthered the Virginia Plan (q.v.), and in 1789 was made first attorney-general of the U.S.A. by Washington. After being secretary of state for a year in Washington's Cabinet he resigned in 1795 owing to unfounded allegations. He was subsequently a leader of the Virginia Bar. He pub. *A Vindication of Mr Randolph's Resignation*, 1795, and *Past and Present State of Affairs Public*, 1796.

Randolph, John, of Roanoke (1773-1833), Amer. politician, b. Cawsons, in Virginia, descended from the Indian princess Pocahontas. He was in the National House of Representatives from 1799 to 1813, in 1816, from 1819 till 1825, and again from 1827 till 1829; and in the Senate from 1825 till 1827. He was chairman of the committee of Ways and Means from 1801 till 1807. In 1826 he fought a duel with Henry Clay, but later they became firm friends. R. entered Congress when hardly more than a boy, and as a wit he has not often been surpassed in Congress. He was opposed to slavery, and freed his own slaves by his will. *See* lives by H. Adams, 1882, and W. C. Bruce, 1923.

Randolph, Thomas, first Earl of Moray (d. 1332), Scottish soldier and statesman,

only son of Thomas R. of Nithsdale and Lady Isabel Bruce, sister of King Robert the Bruce. After the murder of Red Comyn, R. joined Bruce, 1306; in the same year he was made prisoner by Aymer de Valence at Methven, and his life was spared by his swearing fealty to Edward I of England. He fought against Bruce, and in 1308 was captured by Sir James Douglas. His uncle, the Bruce, pardoned him and, in 1314, created him Earl of Moray and lord of Man and Annandale. In the same year he accomplished a brilliant feat of arms, the taking by surprise of Edinburgh Castle at night with 30 followers who scaled the rock by a secret path. At Bannockburn (1314) R. commanded a part of the Scottish Army, and in 1315 he distinguished himself by his courage in the expedition to Ireland. Returning to Scotland with Sir James Douglas, he seized Berwick. He was one of the ambas. sent to conclude peace with England. On the death of Bruce in 1329 he was appointed regent and guardian of David II, and died while preparing to drive back an invasion of the Eng. barons.

Randolph, Thomas (1605-35), poet and dramatist, b. Newnham-cum-Badby, Northants. Educ. at Westminster and Trinity College, Cambridge, he was a friend of Ben Jonson (q.v.) and had a reputation as a wit. His earliest printed work is *Aristippus or the Soviet Philosopher*, 1630. Others are *The Jealous Lovers*, 1632, and *The Muse's Looking-glass*, 1638. The pastoral *Amyntas*, and a vol. of *Poems* were also pub. in 1638. His works were ed. by W. C. Hazlitt in 1875.

Random Island, off the SE. coast of Newfoundland (q.v.), Canada, in an arm of Trinity Bay, length 20 m., average width 7 m. There are sev. fishing vls.

Randwick, metropolitan municipality of Sydney in Cumberland co., New S. Wales, Australia, 3 m. SE. of the city of Sydney. Pop. 99,530.

Ranelagh: 1. Building erected at Chelsea in 1742 on a plot of ground which had belonged to the Earl of R. The structure resembled the Pantheon at Rome, being a wooden rotunda built to accommodate some 6000 people. During the 18th cent. it was a popular pleasure resort and place of entertainment; the tea gardens were frequently visited by Johnson, Reynolds, Goldsmith, Walpole, and other notables. From 1788 it declined rapidly, and was demolished and the gardens closed in 1804.

2. Formerly a celebrated club at Barnes, on the S. bank of the Thames, founded in 1894. Prior to the Second World War it was famous for its polo matches.

Range, *see* RANCH.

Rangefinder, or **Telemeter**, instruments devised for calculating the distance of an object with the minimum of trouble in measuring a base. Fig. 1 shows the principle involved. If O be the observer, P the point whose distance OP is required, a base line OA is measured, 60-120 yds, so that the angle PAO is a right angle; an

object C is observed at right angles to OA and the angle COP measured; since this equals the angle P, the triangle PAO is known and therefore the distance OP. Another method measures OD, a shorter base of some 6 yds at right angles to AO and observes the angle OAD, from which AO is known and OP found as before, $OP = AO \cdot \csc \angle OPA$, or in the second

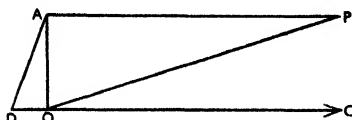


FIG. 1.

PRINCIPLE OF RANGEFINDER

case $OD \cot \angle OAD \cdot \sec \angle POA$. The R. is of great importance in the Navy and Army, as well as being of service in surveying, and ease and rapidity of use are obtained by constructing an instrument on the principle of the sextant for observing the angles; the readings are, by suitable mechanism and graduations, given directly in yds. In the Labbez telemeter observations are made at either end of a base line, coincidence of image being obtained by rotating a small toothed wheel and the milled end of the instrument respectively, the distance in yds being read on the barrel opposite a mark on the milled head; a base of 20 yds is required, the range varying from 250 to 3000 yds. The Dredge-Steward omni-telemeter is a modification of the box sextant; at zero the mirrors are at an angle of 45° , and both are adjustable; a table of distances for a calculated base of 50 yds is read in connection with the turning of a micrometer screw.

Fig. 2 illustrates in a simple way the principle of the Watkin R., once used in

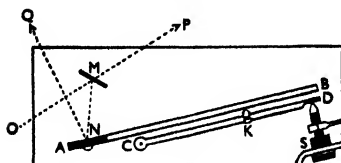


FIG. 2.

PRINCIPLE OF WATKIN RANGEFINDER

the Army. M, a fixed glass, half mirror, half transparent, allows a view of the point P, whose range is required to be taken from O, the observer; the second object Q reflects from the mirror N carried firmly on the arm AB, both mirror and arm being pivoted so that Q may be aligned with P by a movement of the arm. This is obtained by turning the screw S,

which presses on another pivoted arm CD, thus urging the sliding collar K against AB. CD is graduated so that K may be adjusted according to the length of the base line measured. The image Q being brought into coincidence with P, an index on the screw collar points out the range in yds, marked on the screw. With base (Fig. 1) $AO = 60-130$ yds and $OD = 6$ yds, ranges up to 500 yds may be read; with $OD = 12$ yds it will read up to 8000 yds, with an error not exceeding 2 per cent under conditions of well-selected bases.

The Monostatic Telemeter. The monostatic telemeter has a very short base, which is part of the instrument itself with a single screw at the observation post. This telemeter is the outcome of a series of instruments whose developments had their beginning in the bistatic telemeter

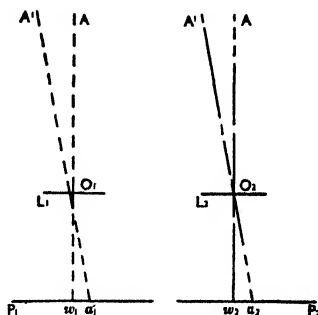


FIG. 3.

PRINCIPLE OF MONOSTATIC TELEMETER

Left, Point A at infinity.

Right, Point A at a finite distance.

with horizontal base. The following equation will illustrate the principle: Let us suppose that there are 2 identical binoculars whose axes, in a horizontal plane, are parallel and at a distance b from each other. In Fig. 3 these 2 binoculars are represented by their objectives L_1 and L_2 , and the focal planes of these objectives by P_1 and P_2 . Let w_1 and w_2 be the points of junction of each optical axis with the corresponding plane, these points being in the focal planes. A point A at infinity in the common direction of the 2 axes gives in each of the binoculars an image coincident with w_1 and w_2 . If the point is in A' , to infinity, in a different direction from that of the axes, it gives 2 images a'_1 and a'_2 , and it is evident that $w_1 a'_1 = w_2 a'_2$. In the right-hand figure a point A is given at a finite distance. Let D be the distance of this point from the vertical plane containing the 2 objectives. This point gives in each binocular an image a_1 and

a_1 , and accordingly we get the properties of like triangles:

$$\frac{b_1}{D} = \frac{w_1 a_1}{f}$$

$$\frac{b_2}{D} = \frac{w_2 a_2}{f}$$

meaning by f the common focal point of the 2 objectives. The monostatic telemeter is of great service to the surveyor, engineer, and explorer for speedy measurement of distances.

Up to the Second World War the R. was regarded by experts as indispensable in naval and land warfare and anti-aircraft gunnery. The basic principle as gener-

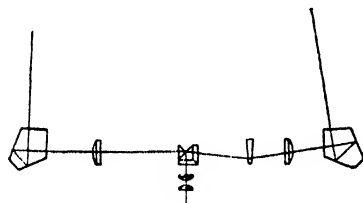
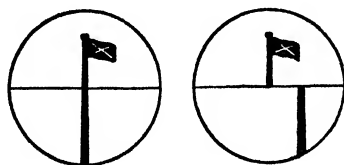


FIG. 4

ELEMENTS OF COINCIDENCE RANGE-FINDER

ally adopted by them was the invention of Barr and Stroud. The first of their R.s were for naval use and had a base of 3 ft.; in the Second World War their largest naval R.s had a base of 42 ft. Their land instruments comprise portable, mobile, and fixed position types, and are of various bases from 8 in. to 100 ft. The Coincidence R. produces, in the field of view of a single central eyepiece, 2 images of an object formed by rays entering the 2 ends of the instrument. Such images are separated usually by a fine horizontal line. Separation may be effected: (1) by refraction through the faces of a bi-prism, intersecting at an obtuse angle in a very fine edge which is in the focus of the eyepiece or (2) by reflection, with or without the use of silvered surfaces. Coincidence of the images is obtained by means of a refracting prism of small angle, placed in the beam between the central prism combination and one of the end prisms. Movement of the refracting prism in the R. tube displaces one image relatively to the other; when the prism is adjusted to give coincidence a scale moving with it indicates the range. Various forms of coincidence field of view are in use, having erect or inverted or inset strip images. The latter type is particularly useful in anti-aircraft observation, enabling the whole field to be used for following the target while the strip image is moved across the main image for the measurement. In some cases vertical base R.s have been used, these having a vertical separating line in the field of view.

In Stereoscopic R.s there are 2 eyepieces, through which the observer's eyes view the images formed respectively by the 2 ends of the R. These images are combined in the brain to form a single image having apparent depth in space, the impression obtained being similar to that in ordinary binocular vision with the unaided eyes. In the R., however, stereoscopic relief is exaggerated, because of optical magnification and the difference in optical base of the R. and of the observer's eyes. A fixed reference mark is usually provided in each field of view and the R. so adjusted that, when the 2 fields are observed together, the mark appears at an infinite distance; the image of an infinitely distant object (say a star) with then appear to be at the same distance as the mark. To see a nearer object stereoscopically the eyes of the observer must converge and the image will appear stereoscopically to be nearer than the mark. By movement of a refracting prism, similar to that in Coincidence R.s, the object is made to appear equidistant with the mark and a scale associated with the prism indicates range. To assist the observer to a proper mental attitude for stereoscopic measurement it is usual to provide, in addition to the reference mark, a series of subsidiary marks which appear at different depths in space. Only the prin. mark, however, is used for range measurement. Some Stereoscopic R.s dispense with movable parts. A series of marks, say A, B, C, etc., appears in one field, and a corresponding series, a, b, c, etc., in the other. Pairs Aa, Bb, etc., are so disposed that Aa, seen stereoscopically, appear to represent a single mark at, say, 1000 yds, Bb one at 1100 yds, and so on. By observing the target image stereoscopically its position with reference to the index marks can be determined. This method is not so accurate as the moving



TYPICAL FORMS OF FIELD OF VIEW
RANGEFINDERS

Left, In coincidence.

Right, Out of coincidence.

image type, but is useful for certain pur-

The accuracy of a R. depends on base, magnification, and the observer's visual acuity; the error at any range is also proportional to the square of the range, e.g. at 2000 yds is 4 times the error at 1000. In general, the parallax angle to which a modern large R. has to work is

$\frac{1}{2}$ sec., or the angle subtended by a penny at almost 8 m. Accuracies of Stereoscopic and Coincidence R.s are comparable, and, on the basis quoted, the probable error at 10,000 yds with a R. of 5 yds base and magnification 28 is within $\frac{1}{2}$ per cent.

In A.A. gunnery target height is obtained automatically from slant range and angular elevation of the R. Sev. types of range-to-height conversion systems have been used. Optical R.s are naturally limited to conditions of reasonable visibility and cannot be used in fog or through clouds, while at night they require the aid of searchlights. Range-



Barr and Stroud

12-FOOT-BASE STEREOSCOPIC HIGH-
ANGLE RANGEFINDER

The eyepieces are fixed in elevation as the rangefinder is elevated. It is mounted on a naval anti-vibration mounting.

finding by Radar (q.v.), however, has in the last 10 years been developed to a high degree of accuracy, and is only dependent upon the object whose range is to be measured reflecting sufficient of the transmitted radar pulse to operate the detecting equipment. Short pulses of radio signals of about one μ s. (micro-second) duration and repeated a thousand or more times a second are transmitted by directional aerials (q.v.) towards the target. Simultaneously with the transmission of a pulse a time-base circuit is triggered at the receiving equipment which causes the spot on a cathode-ray tube (see VALVES) to commence its travel across the screen, which it does at an accurately determined speed. The echo pulse reflected from the target is made to deflect the cathode-ray tube trace, and the point at which this occurs along it is a direct measure of the time taken by the pulse to travel to the target and back and, as the speed of propagation is constant (186,000 m. per sec.), the range can be determined (i.e. a pulse travels 186,000 m. per sec., equivalent to 327.36 yds per μ s.). But it does the double journey in practice, so that the range represented by μ s. of time is approximately equivalent to 164 yds. An accuracy of 25 yds is easily attainable up to 15,000 yds, and ranges of 100 m. or more can be determined by this method.

Ranger, formerly in England a sworn officer of the forest appointed by the king to watch the deer and prevent theft, etc. The term is now applied to a gov. official connected with public parks and forests. A robber was also sometimes called a R., as he 'ranged' for plunder, whilst the name is also given to a dog who ranges over the ground. Irregular mounted troops were also called R.s (cf. Connaught R.s). In the Amer. Army commando troops are called R.s. The R. is also a senior grade in the girl-guide movement (see GIRL GUIDES).

Rangoon, cap. of Burma, on the l. b. of the Rangoon R., 21 m. from the sea. Within the last cent. it became the third seaport of importance in Brit. India. The whole trade of the delta of the Irrawaddy concentrates here. The riv. is navigable for 900 m., and for some distance from the mouth is over 1 m. in width and excellent for shipping purposes. The rice exported before the Second World War averaged 2,000,000 tons per annum; timber and petroleum are next in importance. The city is dominated by the great pile of the Shwe Dagon pagoda (the religious centre of Burmese life), covered with pure gold. R. passed, with the prov. of Pegu, into Brit. hands in 1852. It possessed 2 cathedrals, and every kind of mosque, church, temple, pagoda, and synagogue, but a great many of these have been wholly or partly destroyed. There was a gov. college and 2 non-conformist colleges. The teaching univ. of R. was constituted in 1920, with 2 art colleges. Before the Second World War the water supply and drainage had been improved, but the general death-rate still remained rather high. R. was bombed by the Japanese on 4 Jan. 1942 and their advance in Burma led to the complete civilian evacuation of the city being ordered within 2 days (21-22 Feb.); the city was abandoned by the Allies on 7 Mar. Jap. forces occupied R. on 8 Mar. 1942, but after the total defeat of Japan in Aug. 1945 the Brit. governor returned to R. on 16 Oct. and the civil administration of Burma was resumed from that date. (For details of military operations see BURMA, SECOND WORLD WAR CAMPAIGNS IN.) Approached from the air in 1946, R. seemed at first glance not to have suffered excessively, but closer inspection on foot revealed a different and hideous picture. Along the waterfront round the main station the devastation was complete. Ac. of formerly dense housing had been wiped out and were no longer even rubble. Elsewhere buildings superficially intact, were found to be unusable shells, with the interiors looted and charred. Probably about 80 per cent of the *n* needed to be rebuilt. Pop. (1953) 737,000.

Ranjit Singh (1780-1839), 'the Lion of the Punjab,' Indian ruler and founder of the Sikh kingdom in the Punjab, laid the foundation of his power when he obtained Lahore from Zaman Shah in 1799. In 1809 he made a treaty with the Brit., whose power he recognised and to whom

he was loyal. His ideal was realised by 1820, when the Puniab, from the Sutlej to the Indus, was consolidated under his rule. In 1833 he obtained the Koh-i-noor diamond from Shah Shuja.

Ranjitsinhji, Kumar Shri, H.H. Maharaja Jam Sahab of Nawanagar (1872-1935), Indian prince and famous cricketer, b. Sarodar, prov. of Kathiawar. He was educ. at Rajkumar College, Rajkote, India, and Trinity College, Cambridge. At cricket he represented his univ. and in 1895 began a long association with Sussex Co. C.C. In 1896 he headed the Eng. batting averages and broke the record season's aggregate of 2739 runs set up by W. G. Grace in 1871. In 1899 he became the first cricketer to exceed 3000 runs in a season; in 1900 he had another splendid year with 3065 runs. He played 15 times for England against Australia, and was one of A. E. Stoddart's team in Australia 1896-7. In 1899 he led a team to N. America. His batting was remarkable for its extreme grace and ease, and the excellence of his leg glide has never been surpassed. But cricket honours were but a prelude to honours in a greater field. He had been adopted by Jam Shri Sir Vibhaji Sahab of Nawanagar as his heir, but, with the sanction of the Brit. Gov., the adoption had been set aside in favour of a son. The son, however, d. in 1906, and R. succeeded to the throne. The fortunes of Kathiawar were then at a low ebb, and R. set himself to achieve prosperity. Regardless of all obstacles, he carried out a programme of slum clearance, sanitation, and irrigation; he built railways, hospitals, and schools; his capital was transformed into a fine modern city and he created the Port of Bedi. He served in Europe in the First World War, and was afterwards a distinguished representative of India in the League of Nations. After his death an inter-provincial cricket tournament in India for the Ranji Trophy was instituted in his honour. He wrote *The Jubilee Book of Cricket, 1897*. See life by Roland Wild.

Rank, Joseph Arthur, Baron (1880-), financier and film magnate, b. Hull; educ. at Leys School, Cambridge. He became joint managing director of Joseph R. Ltd., the flour-milling business estab. by his father, Joseph R. (d. 1943). He is chairman of the Brit. film exhibition and production organisations of the J. Arthur R. Organisation, Odeon Theatres, Gaumont Brit. Corporation, Denham and Pine-wood Studios, and Alliance Productions. He is also head of the General Cinema Finance Corporation Ltd. He was created baron, 1957.

Rank, the particular station occupied by a class of persons in a society, or degrees in a hierarchy. It is generally of two kinds, 'official' and 'social'; an example of social R. is the difference between citizens and subjects in the Rom. Empire. In modern times only official R. survives in Europe, notably in the armed forces of govts. R. is here con-

sidered only in regard to male members of the R.N., army, air force, police, and fire services. R.s in Queen Alexandra's Imperial Nursing Service are given under **MILITARY NURSING SERVICE**.

IN THE NAVY. Officers who enter the navy as such rise from cadet to midshipman, sub-lieutenant, lieutenant, lieutenant-commander, commander, captain, rear-admiral, vice-admiral, admiral, admiral of the fleet. Time as sub-lieutenant varies from 16 to 28 months, and depends on the number of first-class certificates awarded in examinations to lieutenant (see **NAVAL EDUCATION**). Thereafter promotion is automatic to lieutenant-commander after 8 years' seniority as lieutenant. Promotion to commander and captain is selective for those of 2-8 years' and 4-8 years' seniority respectively in the previous R.s for executive officers. In other branches (engineering, supply, etc.) these zones for promotion are slightly different. All such promotions are promulgated on 30 June and 31 Dec. each year. For flag R., officers are selected from the top 5 years of the captains' list, which means, in practice, that the majority are promoted in their last and eighth year as captain. Officers not promoted are compulsorily retired with pension as follows: lieutenant-commander at age of 45, commander at age of 50, and captain on reaching 8 years' seniority. The R. of commodore (first or second class) is a temporary R. given to senior captains when holding particular posts, e.g. commodore of barracks, chief of staff to an important commander-in-chief, etc. A limited number of men are promoted to sub-lieutenant by selection and examination from able seamen, in which rate they must have served 9 months and be under the age of 23, a limit which was reduced to 22½ in Nov. 1950. Of the above R.s that of admiral (q.v.) is one of the oldest and appears in Eng. records in the year 1300. It was first personal to the official in supreme command of all naval forces, but by 1311 became general for officers in command of fleets. At about this time, also, the R. of captain came into use, though records indicate that Edward the Confessor's prin. ship carried a rector or captain—apart from the 'batsuen' (boatswain)—who, in those days, commanded the crew in action, acting as master, pilot, or steersman. When first introduced, the precise duties of a captain were uncertain, but they were later defined as the supreme command of a ship, although the navigation and handling was left to the master. The R. of lieutenant was introduced in 1580 with the object of providing the captain with an assistant combatant officer qualified to take his place on occasions, and also to form a body of trained sea officers from whom the captains of the R.N. might be drawn. At first there was only one lieutenant for each ship, and the captain chose him from among his personal friends. Midshipman as a grade was also used at this time, and men were so called because they represented that



LEADING RATING



PETTY OFFICER

CHIEF P.O.
(CAP)GOOD CONDUCT
OR SERVICE BADGEBRANCH
OFFICER

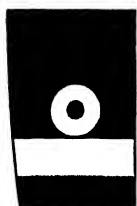
SUB-LIEUTENANT

LIEUTENANT
(R.N.R.)LT. COMMANDER
(R.N.V.R.)

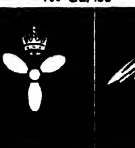
COMMANDER



CAPTAIN

COMMODORE
2nd CLASSREAR-ADMIRAL
OR COMMODORE
1st CLASS

VICE-ADMIRAL

ADMIRAL OF
THE FLEETGUNNER'S
MATECHIEF STOKER
OR STOKER P.O.

RATING PILOT

QUARTERMASTER
RATINGVISUAL
SIGNALMAN
1st CLASS

MASTER-AT-ARMS

SICK BERTH
ATTENDANTSURVEYING
RECORDERSHIPWRIGHT
ARTIFICERTELEGRAPHIST
1st CLASS

SOME BADGES AND MARKS OF RANK IN THE ROYAL NAVY

The style of interlaced and wavy bands shown for lieutenant (R.N.R.) and lieutenant-commander (R.N.V.R.) are worn by all officer ranks of these reserve forces. The badges in the two lower lines are of non-substantive ranks: of these only a few are shown.

part of a ship's company who worked between the main and mizzon masts. They were not given a special uniform until 1748, although in the reign of Queen Elizabeth they formed the basis of a scheme for 'breeding officers and gentlemen who should also be seamen.' Charles II laid down, among other qualifications for the R. of lieutenant, that 3 years' service, including one as a midshipman, was essential. He also ruled that no person could become a captain until he had passed for lieutenant. The R. of sub-lieutenant was originally created by Lord St Vincent in 1802 for those deserving officers who had served their time and passed for lieutenant, but for whom there were no vacancies. Indeed, many officers never rose above the R. of midshipman. The R. of commander is of comparatively recent date, and that of lieutenant-commander for a lieutenant of 8 years' seniority was not estab. until the middle of the First World War. The title naval cadet was substituted for that of volunteer in 1844. Before the estab. of the R. of lieutenant the only other officers in a ship were those who had received warrants from the Admiralty or Navy Office to act as master, purser, surgeon, boatswain, gunner, carpenter, cook, etc. These warrant officers formed an advisory board to the captain and wielded considerable power, the boatswain and gunner being, next to the captain, the chief fighting officers of the ship. They were, in fact, known as the 'standing officers' of the Navy. As lieutenants grew in numbers and importance, the status of warrant officers declined and, in the reign of William III, their powers and privileges were much curtailed. Later, in the late 18th cent., the master (who corresponds with the navigating officer of to-day), the purser (corresponding to present-day supply officers), and the surgeon were absorbed into the wardroom and became commissioned, while the remainder formed the basis of the modern warrant officer grade. There is thus no analogy with the naval warrant officer in either of the other 2 services and, to overcome the misunderstandings that arose over their status *vis à vis* the Army and R.A.F., an order was issued in Mar. 1949 that they were to be known henceforth as 'branch' officers. These officers include the commissioned shipwright, gunner, boatswain, engineer, writer, etc., and are selected from suitable ratings between the ages of 25 and 34 who pass the necessary qualifying examinations in their particular branch. A branch officer of 10 years' seniority automatically becomes a senior commissioned gunner, etc., and further promotion is by selection. Branch officers, however, can receive direct promotion to lieutenant after 3 years' seniority so long as they are under the age of 35, but must be qualified to carry out the more general duties of that R. as opposed to the narrow limits of their specialised branch, if they are to be selected. Ratings (other than artisans) are entered as boys or ordinary seamen (ordinary signalmen, stokers II, etc.)

if over the age of 18. On passing the necessary tests they are rated able seaman (signalman, stoker I, etc.). Promotion to the leading petty officer and finally the chief petty officer rates is first by examination and recommendation. Names are then placed on depot rosters for promotion as vacancies occur. Captains of H.M. ships, however, can authorise temporary promotions under certain circumstances. They also have the power to disrate for serious offences. Artisan ratings, when qualified, automatically acquire the rate of petty officer at the age of 21.

IN THE ARMY. The use of titles denoting military R. with their present meaning is comparatively modern, only captain having been used in late medieval times to denote as now the commander of a company, which was the largest permanently organised body of professional soldiers that existed up to Elizabethan times. The captain's deputy was called lieutenant, like any other deputy, and for a long time had to be particularised as lieutenant-captain. Next below him ranked the ensign or ancient, vulgarly known as the 'rag-carrier,' which sufficiently explains his duties in action. The equivalent R. in the cavalry up to about 1872 was 'cornet,' now totally obsolete. Sergeant in its military sense also dates from the Middle Ages, and originally meant one whose feudal tenure of land obliged him to follow armed the tenant-in-chief to the field. It acquired the sense of one deputed to enforce discipline. As the unit of trained soldiers became larger, the chief sergeant of a regiment was called the sergeant-major, and at the time of the Civil war this officer ranked above captain and fulfilled the duties of the modern adjutant. Then the word was taken to mean the disciplinary chief of a company, and the corresponding officer of a regiment was called simply major. The whole force at this time was administered by the sergeant-major-general, now abbreviated to major-general, under the command of the captain-general (now simply general) whose deputy was the lieutenant-general. Colonel originally meant the commander of a column (of companies), and in the 17th cent. his primary function was to recruit and pay a regiment which would be named after him (e.g. 'Kirke's Lambs'). As the colonel might at the same time be a general, actual command of the regiment or its battalions if there were more than one was exercised by the lieutenant-colonel. This is the origin of the modern custom of appointing honorary colonels of regiments.

A relic of the condottieri (mercenaries, usually Eng. or Ger., in the service of the It. city-states) is found in the title corporal, an officer of the lowest R. commanding a small body ('corpo') of men, and in the prefix lance- (from an It. word meaning veteran). Lance-corporal thus meant a senior soldier acting in the place of a corporal, and lance-sergeant a senior corporal doing duty as a sergeant. In

the Household Cavalry sergeants are known as corporals of horse and warrant officers (*see below*) as corporals-maj.

Army R. is of the following qualities: *Substantive*, which is absolute. *Brevet*, which has the security of tenure of substantive, but it does not carry the pay of the higher R., e.g. a sub-captain with the brevet of maj. is paid as a captain; brevet R. is somewhat in the nature of reward for good service and appears in the new year and birthday honours list half-yearly; it is essentially a peacetime institution, and usually means that an officer cannot be promoted to the R. which his seniority and proficiency deserve, because owing to restricted estab. the appointments which go with the R. do not exist. *Temporary*: This is usually granted to an officer when holding an appointment usually held by an officer whose R. is higher than his own. *Acting* and *Local*: These are variants of temporary, but not so permanent; they are usually granted to meet situations where an estab. must be completed quickly and is of short duration. *Honorary* carries the privileges (generally) but not the pay of the R. It was formerly granted to bandmasters, quartermasters, etc., while serving, but now applies only to reserve and retired officers. Officers' substantive R.s are second lieutenant, lieutenant, captain, major, lieutenant-colonel, colonel, major-general, lieutenant-general, general, field-marshal—promotion to these R.s is notified in the *London Gazette*.

There are at present 2 grades of warrant officer, holding their R. by virtue of a warrant signed by the secretary of state: warrant officers class I and class II. For a short time up to 1941 there were also warrant officers class III, who commanded platoons or equivalent sub-units (platoon sergeant-major or troop sergeant-major).

Non-commissioned officers are those below warrant R. and above private (or trooper, guardsman, rifleman, fusilier, marine, gunner, sapper, signaller, driver, craftsman, etc.), according to arm of the service. They are corporal, sergeant, and staff-sergeant.

The Queen's Regulations lay down the precedence of the various R.s and the table of comparative R. in other services. The pay warrant lays down the pay and pension for each R., and in many cases the conditions of promotion. Originally the military R.s corresponded exactly to the appointments or functions discharged by their holders. But as military organisation became more complex the variety of appointments greatly exceeded the number of R.s. As an example of modern practice in the Brit. Army, the following list of the estab. of an infantry battalion shows the R.s held by commanders and staff: Battalion: commanding officer, lieutenant-colonel; second-in-command, major; adjutant, captain; quartermaster, captain; medical officer, captain; regimental sergeant-major, warrant officer, class I; quartermaster sergeant, warrant officer, class II. Company: commander,

major or captain; second-in-command, captain; sergeant-major, warrant officer, class II; quartermaster-sergeant (colour-sergeant), staff-sergeant. Platoon: commander, lieutenant or second lieutenant; second-in-command sergeant. Section: commander, corporal; second-in-command, lance-corporal. It will be seen from this list that though the terms regimental sergeant-major, regimental quartermaster-sergeant, company sergeant-major, staff-quartermaster-sergeant, lance-sergeant, and lance-corporal are used as titles they are not in fact R.s but appointments.

Promotion. In the Brit. service promotion was by purchase up to 1870, when the system of promotion by seniority and examination, tempered by selection, was introduced. Above the R. of lieutenant-colonel promotion is normally by seniority and selection. Second-lieutenants may be promoted to lieutenant after 3 years' commissioned service on the recommendation of their commanding officer; promotions to higher R.s may be made only when a vacancy exists in those R.s. Professional examinations adapted to the arm of the service to which the officer belongs are prescribed for each R., and examinations are held half-yearly. Lieutenants taken prisoners of war may be promoted to capt. as if they were serving in their regiments; capts. taken prisoners of war may be promoted to maj. on release or exchange. Promotion, irrespective of establishments, may be conferred on a colonel, a brigadier, a maj.-gen., or a lieutenant-gen. (i) during a period of war, (ii) for distinguished service in the field, or (iii) for distinguished service of an exceptional nature. The promotion of non-commissioned officers is by seniority and examination up to and including sergeant, and thereafter by selection tempered by seniority. Bandmasters are promoted warrant officer Class I on appointment. Promotion by 'time' is more prevalent than among officers. The above rules are those obtaining in time of peace. Obviously promotion is much more rapid for all R.s in war-time.

In the R.A.F. With the formation of the Royal Flying Corps on 13 May 1912 naval and military wings were estab., and officers who were transferred to the new corps retained their existing naval or military R. In the middle of 1914, owing to the rapid growth of the naval wing, it was necessary that a reorganisation should be effected. On 1 July 1914 the separate existence of a naval air force was officially recognised when the naval wing of the Royal Flying Corps became the Royal Naval Air Service, in which new R.s were instituted as follows: wing capt. (relative rank, capt. R.N.); wing commander (commander); squadron commander (lieutenant-commander); flight commander (lieutenant); flight lieutenant (lieutenant); flight sub-lieutenant (sub-lieutenant); warrant officer 1st grade (commissioned warrant officer); warrant officer 2nd grade (warrant officer).

Among the many questions which had

to be dealt with when the R.A.F. was formed on 1 April 1918 was that of naming the officers of the new service. A list of titles was prepared as follows: ensign, lieutenant, flight leader, squadron-leader, reserve, banneret, fourth ardlan, third ardlan, second ardlan, ardlan, air marshal. An alternative list slightly varied the R.s above squadron-leader. The suggestions were wing leader, leader, flight ardlan, squadron ardlan, wing ardlan, and so on. The War Cabinet decided, however, to adopt military titles. So it was that on 1 April 1918 all those naval officers who transferred to the R.A.F. changed their naval titles for military ones. These military titles remained until the new titles for commissioned R.s as they exist to-day were announced in orders promulgated by the Air Council on 27 Aug. 1919 and came into use immediately.

Commissioned Ranks. The most junior commissioned R. in the R.A.F. is that of pilot officer, whilst the most senior is that of marshal of the R.A.F., intermediate R.s being flying officer, flight lieutenant, squadron-leader, wing commander, group captain, air commodore, air vice-marshal, air marshal, and air chief marshal. There are now 20 different branches in the R.A.F., viz. general duties (flying), technical, equipment, secretarial, R.A.F. Regiment, aircraft control, fighter control, marine, airfield construction, medical, dental, medical quartermaster, dental quartermaster, education, provost, catering, physical fitness, legal, chaplains, and directors of music; and officer R.s are the same for all these branches, although the higher R.s are not attainable in some branches with small estab.

In most branches promotion to the substantive R.s of flying officer and flight lieutenant is given after certain qualifying periods of satisfactory commissioned service: in a few professional branches, however, promotion is given up to the substantive R. of squadron-leader on a time basis—all other substantive promotions are by selection to fill vacancies in the estab. In most of the branches officers are required to pass a promotion examination in order to qualify for promotion to the substantive R.s of flight lieutenant and squadron-leader. Promotions are announced in the *London Gazette* normally at half-yearly intervals.

There are 3 kinds of R. in the R.A.F., i.e. substantive, acting, and honorary. **Substantive rank** is related to the peacetime estab. and is not normally subject to change except by promotion. **Acting rank** is granted to an officer filling a vacancy in a R. higher than his substantive R. and is withdrawn when the officer ceases to fill such a post. **Honorary rank** carries with it no executive command, but is complimentary in nature. During the Second World War there were 3 additional R.s: **temporary rank** was granted to officers selected for promotion to fill vacancies in the R. of flight lieutenant and above in the war-time estab.,

while **war substantive rank** was granted to officers in the junior R.s on completion of certain qualifying periods of service, or to officers after holding higher paid acting or temporary R. (or both) for certain specified minimum periods. The substantive R. which an officer holds determines the age at which he will normally retire on pension. This age of retirement varies between branches, e.g. that for officers of the general duties (flying) branch is lower R. for R. than for officers serving in the ground or professional branches. The relative R.s of R.A.F. officers with those of officers in other services are laid down in Queen's Regulations and Air Council Instructions.

Cadets hold the R. of airman but are given the status of officer cadet whilst under training at the R.A.F. College, Cranwell (for permanent commissions in the general duties, equipment, and secretarial branches) and at the Royal Military Academy, Sandhurst (for permanent commissions in the R.A.F. Regiment). On the successful completion of training, and subject to continued medical fitness, cadets are appointed to permanent commissions with the R. of pilot officer.

Airmen (other than Aircrew). The R. of warrant officer corresponds with the army warrant officer class I. The other non-commissioned officer R.s are flight-sergeant, sergeant, and corporal, whilst the classes of aircraftmen are leading aircraftman, aircraftman 1st class and aircraftman 2nd class. R.s and classes are the same for all trades. Airmen normally enter as aircraftmen 2nd class and are mustered to a specific trade after passing the necessary tests. Re-classification to aircraftman 1st class and leading aircraftman is effected after passing further tests, and in some cases completing specified periods of time. Promotion to non-commissioned officer and warrant R. is generally made to fill estab. vacancies.

Aircrew. Prior to 1 July 1946 there were no distinctions in R.s as between airmen employed on ground duties and those whose duties were performed in the air. With effect from that date, however, all airmen mustered in a flying category, whether under training or qualified, were designated 'aircrew' and given new R.s as follows: cadet pilot, navigator, signaller, engineer, or gunner; pilot IV, navigator IV, etc.; pilot III, navigator III, etc.; pilot II, navigator II, etc.; pilot I, navigator I, etc.; and master pilot, master navigator, etc. These R.s correspond to airmen's R.s as follows: cadet pilot, etc.—A.C.II; pilot IV, etc., and pilot III, etc.—corporal; pilot II, etc.—sergeant; pilot I, etc.—flight sergeant; and master pilot, etc.—warrant officer.

POLICE. In the boms. and cos., R.s in the police are constable, sergeant, inspector, superintendent, and chief constable. A chief constable may have an assistant with the R. of assistant chief constable, or an officer of lower R., but with the title of deputy chief constable. Areas under local police authorities in the

bors. and cos. are each in charge of a chief constable and are divided into divs. in charge of a superintendent, and into sub-divs. or smaller areas in charge of an inspector or, possibly, a sergeant. In towns where the beat system is in use a sergeant has charge of a section of 8 or 10 men; his general duties are to supervise their duties and hours and visit them on their beats. A sergeant may have special station duties of various kinds without charge of a section. An inspector may have charge of a number of sections and sergeants, or he may have charge of a sub-divisional or smaller station, or have various full-time duties as assistant to officers of higher R. in connection with station work. A chief inspector may have special divisional or H.Q. duties, but he is usually in charge of a sub-divisional station. A superintendent is usually in charge of a divisional station, or one of the larger units of area into which co. police areas are divided. In the Metropolitan Police (q.v.) there are no chief constables. The R.s above that of superintendent are deputy commander, dist. commander, commander, assistant commissioner, deputy commissioner, and commissioner. The R.s of the C.I.D. in all forces are detective constable, detective sergeant, detective inspector, and detective superintendent. Women police have the same R.s as all others, but with the official prefix 'Woman Police' in each case. Police in Scotland have an additional R., that of lieutenant. It originally designated special duties in connection with the keeping of records, but is now nearly equivalent to the R. of chief inspector.

FIRE SERVICES. R.s and responsibilities attached thereto in the fire services in England, Wales, and Scotland are (Scottish R.s in parentheses where titles differ): chief officer (firemaster), command of a co. or bor. (burgh) brigade; assistant chief officer (no corresponding R. in Scotland); divisional officer, grade I (assistant firemaster), in charge of a div. of a brigade; divisional officer, grade II, in charge of a div. of a brigade; divisional officer, grade III (column officer), in charge of a div. of a brigade; assistant divisional officer (senior company officer); station officer (company officer), in charge of a station; sub-officer (section leader), deputy to station officer, or in charge of a small station; fireman, in charge of a fire appliance.

Ranke, Leopold von (1795-1886). Ger. historian, b. Wiehe, Thuringia, studied at Leipzig and Berlin, and in 1818 became a schoolmaster at Frankfurt-on-Oder. He was prof. of hist. at Berlin 1837-72, and examined the archives of Vienna, Venice, Rome, and Florence during 1828-31. He ed. the *Historische Politische Zeitschrift*, of which he wrote a considerable part, and in 1841 was appointed historiographer of Prussia. His numerous works include *Die römischen Päpste im 16. und 17. Jahrhundert*, 1834-9; *Deutsche Geschichte im Zeitalter der Reformation*, 1839-47 (critical ed. by P. Joachimsmen,

1925-26); *Französische Geschichte im 16. und 17. Jahrhundert*, 1852-68, 1876-7; *Englische Geschichte im 16. und 17. Jahrhundert*, 1859-68, 1877-79; *Deutsche Geschichte von 1780-90*, 1871-2; *Zuverlässige Bücher preussischer Geschichte*, 1874, 1878-9; *Weltgeschichte* (to the death of Otto the Great, continued by others to 1450, 1881-8, 5th ed. 1922). R. was an outstanding historian of his period, his reliance on original sources making his work of lasting value. He did much to found the tradition of modern historical criticism and research. See collected works in 54 vols., 1867-90, new ed. by P. Joachimsmen, 1926 ff., selection by L. von Muralt, 1945. See also bibliography, 1910, and life, 1921, by H. F. Helmuth; E. Fueter, *Geschichte der neueren Historiographie* (3rd.), 1936; F. Meinecke, *Leopold von Ranke: Gedächtnisrede*, 1936, and *Vom geschichtlichen Sinn*, 1939; and G. P. Gooch, *Studies in German History*, 1949.

Ranken, Sir George, see ASKWITH.

Rankine, William John Macquorn (1820-72), engineer and physicist, b. Edinburgh. He was elected a fellow of the Royal Society in 1853 and prof. of civil engineering at Glasgow in 1855. He may be considered one of the founders of the science of thermodynamics. He pub., besides other works, *Manual of Applied Mechanics*, 1858, *Manual of the Steam Engine*, 1859, *Manual of Civil Engineering*, 1862.

Rannoch, Loch, in NW. Perthshire, Scotland, is 9 m. long, about 1 m. wide, and 668 ft above sea-level. Out of it flows the Tummel, a trib. of the Tay.

Ransart, tn in the prov. of Hainaut, Belgium, 4 m. NNW. of Charleroi. There are coal-mines and quarries of sandstone. Pop. 10,200.

Ransom, John Crowe (1888-), Amer. poet and critic, b. Palaski, Tennessee. Educ. at Vanderbilt Univ., he went to Oxford with a Rhodes Scholarship. He was prof. of Eng. at Vanderbilt from 1924 to 1937, and later prof. of poetry at Kenyon College. His books of verse, which are marked by a mordant humour, include *Poems about God*, 1919, *Chills and Fever*, 1924, *Grace after Meat*, 1924, and *Two Gentlemen in Bonds*, 1926. Critical works are *God without Thunder*, 1930, *The World's Body*, 1938, *New Criticism*, 1940, and *Studies in Modern Literature*, 1951.

Ransome, Arthur Michell (1884-), critic and writer of children's books, b. Leeds. Educ. at Rugby, he entered a publisher's office and wrote some books of criticism, including studies of Poe, 1910, and Wilde, 1912. His books for boys and girls are as carefully written as serious novels and are among the best of their kind. They include *Swallows and Amazons*, 1931, *Peter Duck*, 1933, *Winter Holiday*, 1934, *Pigeon Post*, 1936, *We Didn't Mean to Go to Sea*, 1938, *Secret Water*, 1939, *The Big Six*, 1940, and *Great Northern?*, 1947. In 1953 he was made a C.B.E.

Ranters, see METHODISM.

Rantzau, Josias, Comte de (1609-50), Fr. marshal, b. Holstein. He served under the great Condé and completed the conquest of Flanders, gaining fame at the siege of St Jean-de-Loene. So often wounded he had but one eye, one ear, one arm, and one leg. Failing under the suspicion of Mazarin, he was imprisoned in the Bastille and died soon after his release in 1650.

Ranula, see BISACCIA.

Ranunculaceae, family of dicotyledons, 48 genera of herbs and shrubs, largely native to the N. hemisphere, temperate regions; with alternate or opposite leaves, much divided; perfect flowers, usually with 5 sepals and 5 petals, but 2-15 possible; many stamens, many carpels, and superior ovary; fruits are achenes or follicles. Notable genera are *Aconitum*, *Actaea*, *Anemone*, *Aquilegia*, *Caltha*, *Clematis*, *Delphinium*, *Eranthis*, *Helleborus*, *Hepatica*, *Nigella*, *Paeonia*, *Pulsatilla*, *Ranunculus*, and *Trollius*.

Ranunculus, **Crowfoot**, or **Buttercup**, large genus of ann. and perennial plants. Among the Brit. species are *R. aquatilis*, the water crowfoot; *R. flammula*, the lesser spearwort; *R. lingua*, great spearwort; *R. auricomus*, goldlocks; *R. acris*, the meadow buttercup; *R. repens*, the creeping buttercup; *R. bulbosus*, bulbous buttercup, and *R. scaria*, the lesser celandine. Notable species grown in gardens include *R. alpestris*, *R. asiaticus*, *R. gramineus*, and *R. pyrenaicus*.

Ranworth, vil. and par. of Norfolk, England, 7 m. NE. of Norwich, on the edge of R. Broad. In the church is a remarkable 15th-cent. painted chancel screen, with a canopy in fan tracery. Pop. 300.

Ranz des Vaches (Ger. *Kuhreigen*), species of instrumental folk music, is a strain of irregular metrical description, blown on an alphorn, among the Swiss Alps, to call cattle from the valleys to the mt. pastures. During sev. wars in which Swiss mercenaries were employed, a regulation was passed interdicting the R. des V., which produced such a feeling of nostalgia as to provoke desertion. The vocal yodels are obviously derived from the R. des V.

Raoul, see SUNDAY ISLAND.

Raoul de Houdenc, (c. 1180-c. 1234), Fr. poet, probably a native of Houdan, near Pontoise. He was one of the principal followers of Chrétien de Troyes. His main work is a long romance of the Round Table, entitled *Merauais de Portlesgues*, pub. in 1869 by H. V. Michéant, and in 1897 by M. Friedwagner. He is also the author of 2 allegorical poems, *Le Songe d'Enfer* and *Le Roman des Atles*. See W. Zingerle, *Über Raoul de Houdenc und seine Werke*, 1880.

Rap, counterfeit coin which passed current in Ireland for a halfpenny in the reign of George I. before the introduction of 'Wood's halfpence,' although its intrinsic value was only half a farthing. Hence come the phrases, 'Not worth a rap,' 'Don't care a rap,' etc.

Rapaces, see ACCIPITRES.

Rapallo, It. seaport and winter resort, in Liguria (q.v.). It is beautifully situated on a bay on the Riviera (q.v.) 15 m. ESE. of Genoa (q.v.), and has Rom. remains and an anct. castle. There are tunny fisheries, and lace and olive-oil are made. Pop. (tn) 9900; (com.) 16,200.

Rapallo, Treaty of. After the First World War it became necessary to equate Italy's claims to Dalmatia by the treaty of London (26 April 1915) with the claims of the new Yugoslav state. Fiume was not allotted to Italy by the treaty of London, but was claimed by It. Nationalists. In 1920 both Great Britain and the U.S.A. attempted the task of mediation, but when Giolitti became It. Premier he prepared the way to a settlement. Negotiations between Count Sforza and M. Trumbitch, the It. and Yugoslav foreign ministers respectively, were opened at Santa Margherita de Ligure. The T. of It. was signed on 12 Nov. 1920. By its terms Fiume was to be an independent port and Zara autonomous under It. suzerainty. Italy obtained Gorz, Gradisca, Trieste, Istria, part of Carinola, and the is. of Cherso, Lussin, Unie, and Lagosta. The It. boundary was drawn from Monte Nero to Volosca on the coast. All Dalmatia except Zara went to Yugoslavia. The treaty was ratified by both countries before the end of Nov. Another T. of R. was that signed on 18 April 1922, between Germany and Russia, for the mutual renunciation of reparations and the resumption of diplomatic and economic relations.

Rapanul, see EASTER ISLAND.

Rape, div. of the co. of Sussex, England, mentioned in Domesday Book, and still extant. There are 6 R.s. Arundel, Bramber, Chichester, Hastings, Lewes, and Pevensey, and they correspond to sev. 'hundreds' elsewhere.

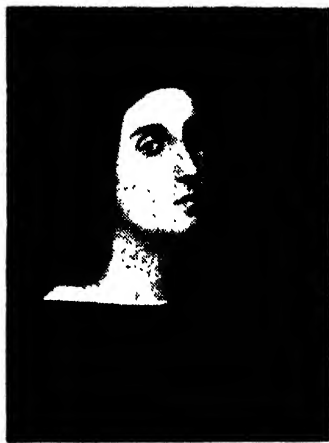
Rape, felony of having carnal knowledge of a woman against her will, by force, fear, or fraud. The prosecution must prove penetration, even the slightest, failing which there may still be a conviction for the attempt (punishable by 7 years' imprisonment under the Attempted Rape Act of 1948) or at the least for an indecent assault. The punishment for R. is imprisonment for life.

Rape, **Cole**, or **Colesseed**, names given to 2 distinct species which are cultivated as a catch crop, and also for their seeds, from which oil is extracted, the succulent leaves and stems providing in 3 months from the time of sowing a large bulk of green food for sheep. The R. varieties of *Brassica campestris* resemble, except in the absence of a root, the common turnip, which is thought to be only a variety. They yield R. or colza oil (see COLZA), but are not grown in Britain. The other species is *B. napus*, and of this species the swede turnip is possibly a variety. The R. varieties of this species are numerous, and when grown for seed fall into 2 varieties. The winter kinds are sown in Aug. and the seeds harvested the following July. The summer variety is sown in April and harvested in Sept.

Raphael, one of the 7 archangels (Tobit, xii. 15). A special concern with medical matters is attributed to him, his name signifying 'God's healer.' His emblem is a fish or a pilgrim's staff; his feast is on 4 Oct. See also AZRAEL.

Raphael Santi, or **Raffaello Sanzio** (1483-1520), one of the most celebrated It. painters of the Rom. school, b. Urbino, son of Giovanni Santi, a painter of some note, and his wife, Magia di Battista Ciarla. The family house still stands, and a wall painting of the Madonna and Child is thought to be a portrait of Magia with her little son. When he was 8 years old R.'s mother d. and 2 years later his father. He may have begun his apprenticeship as painter with his father, and later probably continued with the painter Timoteo Viti at Urbino, and subsequently entered the school of Perugino (q.v.) at Perugia, where he also came under the influence of Pintoricchio (q.v.). Perugino's art no doubt influenced R. at an early age. In the animated beauty and tranquil, flowing lines of Perugino's compositions, R. saw the perfection of his own artistic aspirations. R.'s 'Vision of a Knight' (in the National Gallery), 'St Michael' and 'St George' (in the Louvre), and 'The Three Graces' (at Chantilly) were all painted during his early days at Urbino. Under Perugino he absorbed all the best qualities of this artist's work, and it is more than probable that parts of the master's pictures are attributable to R. But he had already executed independent works, such as the signed painting of the Madonna between St Margaret and St Lucy, dated 1499, which is in the possession of Prof. Rös in Baden, Switzerland; and on 10 Dec. 1500 he undertook, in collaboration with Evangelista di Meleto, a pupil of his father, the execution of an altar-piece for Città di Castello. Among his early independent works, executed from 1502, were 'The Crucifixion,' 'The Coronation of the Virgin,' 'St Sebastian,' and the 'Conestable Madonna.' In 1504 he went to Florence, where he came under the influence of Leonardo da Vinci and Michelangelo, and for 4 years lived an active and stirring life, rapidly developing new powers and acquiring an enlarged field of knowledge. With an extraordinary power of assimilation, he profited from individual attributes of one great master and another, though never becoming a servile imitator of any one. He combined a mastery of workmanship with perfection of design and form, and purity of taste and colour. Some of the chief paintings of this period are 'La Madonna del Granduca' (Pitti), 'Madonna del Giardini,' 'Holy Family with the Lamb,' 'Ansidei Madonna' (National Gallery), 'La Belle Jardinière' (Louvre), 'The Entombment of Christ,' 'St Catherine' (National Gallery), etc. About 1508 he was invited to Rome by Pope Julius II to assist in the decoration of the apartments in the Vatican, the whole of the fresco work being entrusted to him in 1509. The amount of work produced by him from this year till 1511 was prodigious.

His first large work was 'The Dispute of the Sacrament,' and he painted an almost endless number of frescoes, easel pictures, and designs. His real fame rests on his large conceptions such as the 'School of Athens' and 'Mass of Bolsena' (Vatican) while the famous Cartoons for tapestry (Victoria and Albert Museum) are splendid examples of his composition. During the last 6 years of his life he produced many celebrated works, including 'S. Cecilia,' the 'Madonna di S. Sisto,'



W. F. Munsell

RAPHAEL SANTI
Self-portrait (Uffizi)

'The Spazio,' 'The Transfiguration' (unfinished at his death), etc. His versatility of power as a painter remains almost unrivalled, and notwithstanding the shortness of his life there are more than 1400 works attributed to him. As W. E. Suida says: R., in his latest works, is 'no longer the creator of the classical composition; he is Raphael, the Prophet, who foresees new artistic possibilities beyond his time, and points the way to the future. . . . All, Titian, Correggio, Rubens, Poussin, and Rembrandt, the neoclassicists and the Romanticists, even the Moderns, made use of Raphael's inexhaustible richness.' See J. Passavant, *Raphael and sein Vater*, 1838-58; G. Morelli, *Italian Masters*, 1880; E. Müntz, *Raphael, sa vie, son oeuvre*, 1881; and H. Borenson, *Central Italian Painters*, 1897; and lives by R. Duppa, 1816; W. Wanscher, 1927; Paldon Press, 1943; and O. Fischel, 1948.

Raphia, see RAFFIA.

Raphoe, mrlt nt of co. Donegal, Rep. of Ireland, 6 m. NW. of Lifford. It is the centre of the well-known 'Lagan Valley' agric. area and has many historical

associations, including a prehistoric stone circle and ruins of the episcopal palace. The manuf. of tweeds and other woollen materials is carried on at Convoys, a vil. 3 m. to the W. Pop. 800.

Rapid City, cap. of Pennington co., West S. Dakota, U.S.A., second largest city in the state. It is a railway, trade, and distribution centre for a mining and farming region. Products include cement, calcimine, bricks, tiles, and meat products. Gold and granite are found in the area, and grain and sugar beets are grown. S. Dakota School of Mines and Technology is here, and Rapid Valley irrigation project is just E. Pop. 25,310.

Rapier, a sword with a long narrow blade, introduced in historic times into England from Italy, adapted for both cutting and thrusting, and later for the use of the point only. It was popular for civilian use, and employed in duelling in the 16th and 17th cents. The hand was protected by elaborate guards. *See also* ARMOUR; SWORD.

Rapin, Paul de (1661-1725). Fr. his torian, generally known as 'Rapin de Thoyras,' b. Castres (Tarn). He was a Protestant, and on the revocation of the Edict of Nantes, he enlisted in the Dutch Army, and came to England with William of Orange in 1688, taking part in the Irish campaign, and being present at the siege of Carrickfergus and battles of the Boyne and Limerick. He left the army in 1693 and settled at Wesel, where he began his great work *L'Histoire d'Angleterre*, covering the period from the Rom. invasion to the death of Charles I. It was printed at The Hague in 1724, and trans. into Eng. by Tindall, 1725-31.

Rapp, Georg (1770-1847), founder of the Harmonites, b. in Württemberg. As a youth he was the victim of hallucinations and thought himself called upon to purify Christianity. Failing at home, he went to the U.S.A., in 1803, and formed the Harmony Society near Pittsburgh, Pennsylvania.

Rappahannock, riv. of Virginia, U.S.A., rising in the Blue Ridge of the Allegheny Mts. It flows 212 m. to Chesapeake Bay, S. of the Potomac mouth. This and the Rapidan were the scenes of the worst battles of the Civil War.

Raptorez, *see* ACCIPITRES.

Raratonga Island, *see* RAROTONGA.

Rare Earths, oxides of certain metals found in a few rare minerals occurring in Scandinavia, the Urals, Brazil, India, U.S.A., and a few other localities. The chief minerals in which the rare earths are found are gadolinite, cerite, orthite, samarskite, and monazite. The rare-earth metals, their symbols, and atomic weights are: scandium (Sc, 45), yttrium (Y, 89), lanthanum (La, 139), cerium (Ce, 140), praseodymium (Pr, 141), neodymium (Nd, 144), illinium (Il, 174), samarium (Sa, 150), europium (Eu, 152), gadolinium (Gd, 157), terbium (Tb, 159), dysprosium (Dy, 162.5), holmium (Ho, 165), erbium (Er, 167), thulium (Tm, 169), ytterbium (Yb, 173), lutecium (Lu, 175).

Although the oxides of these metals occur in very small quantity in the minerals gadolinite, etc., the greater part of all the members of the group are present, and their separation, which is usually done by fractional precipitation, is a matter of considerable difficulty. The first earths to be discovered were yttria in 1799 and ceria in 1803. Since then each of these has been fractionated, and nearly every earth separated has been shown to be a mixture. For example, the original ceria was split up into true ceria and lanthana, lanthana into lanthana and didymia, didymia into samaria and didymia, samaria into samaria and europia, and the second didymia into praseodymia and neodymia. The rare-earth metals form oxides of the composition R_2O_3 ; some form oxides of the form RO_2 ; while chlorides, nitrates, and sulphates are formed by the reaction of the oxides with the appropriate acid. All the rare-earth metals are now known. Some are important technically, but most remain mere chemical curiosities. An alloy of iron and cerium with lanthanum and other rare-earth metals is used in cigarette- and gas-lighters, since when abraded it emits showers of white-hot sparks.

Rare Gases, *see* INERT GASES.

Rarefaction, process of reducing the density of a gas. This is usually accomplished by means of one of the devices described under AIR-PUMP. If the gas within a receptacle is rarefied, it exerts less pressure, so that there is a tendency for the atmospheric pressure to crush the receptacle. When the air in contact with a liquid is rarefied, dissolved gases tend to be liberated, and the liquid itself tends to evaporate more readily, that is, the boiling-point becomes lowered. The effect of R. of air on human beings is to cause the internal pressure of the body fluids to become apparent, leading to a sense of fullness and throbbing in the head, and to possible effusion of blood from the nose and ears.

Rarotonga, chief is. of the Cook Group and one of the loveliest in the Pacific. 20 m. in circumference, its volcanic peaks rise to over 2000 ft. clothed to their summits in rich vegetation. There are 2 breaks in the fringing reef, on the N. shore, forming small harbours at Avarua, the main settlement, and at Avatiu; but all except very small craft must lie at anchorage off shore. Nearly all kinds of tropical and sub-tropical fruits can be cultivated. The climate is very pleasant, though during the hurricane season (Dec. to Mar.) the humidity is trying to Europeans. Pop. (1954) 6020.

Ras Shamra, sanct city of Ugarit, seaport on Syrian coast, 7 m. N. of Latakia, and cap. of small state which fl. in 15-13th cents. BC though inhabited from the 4th millennium to 600 BC. Excavations by the Fr. under C. F. A. Schaeffer from 1929- produced many fine objects, including ivories and thousands of inscribed clay tablets illustrating the N. Canaanite life and language. The latter were written in Akkadian, Hurrian, and a

special cuneiform alphabetic script, called Ugaritic. Epics in this script have been usefully compared with the O.T.

Ras Tafari Makonnen, see HAILE SELASSIE.

Rash, superficial eruption of the skin, generally consisting of minute papules (q.v.) or pustules (q.v.) or a redness (erythema) due to congestion of the capillaries. It may be caused by external irritation, by the action of certain drugs, or by gastric and intestinal disturbances, or it may be symptomatic of a specific fever, as measles, scarlet fever, etc.

Rashi (c. 1040-1105), name of the Rabbi Solomon Yischaki, one of the greatest of the rabbinical scholars; b. at Troyes. He was the first to compose a commentary on the Talmud and the books of the O.T.

Rashin, port in Korea. Once an insignificant fishing vil., to-day it is a commercial and shipping centre rivalling Dairen, and linked by rail with Changchan. There is a fine natural harbour, which promises to be the chief outlet for the exports of N. Manchuria. Its development was due to Jap. enterprise.

Rasht, dist. and tn of Persia; the tn is the cap. of the prov. of Gilan, 150 m. NW. of Tehran. The Sefid-Rud flows through the dist. Rice, tobacco, tea, silk, and jute are produced. Pop. (of tn) 120,000.

Raskolniki (schismatics), a large body of Russians who separated from the E. Orthodox Church (q.v.) in the 17th cent., because they refused to use the service books as edited and corrected from the old MSS. by the Patriarch Nikon, and took the name of 'old believers' or 'old ritualists.' They have since divided into the moderates, or Priestists, and the extremists Priestless. The latter reject the priesthood and all the sacraments except baptism and confession, and regard all other Christians as in the grip of Anti-Christ. Many of the Priestists have since 1800 been incorporated into the Russian Orthodox Church as Edinverstsy, retaining their old rites. See P. Paschal, *Avvakum et les débuts du Raskol*, 1938; S. Bolshakoff, *Russian Nonconformity*, 1950.

Rasmussen, Knud Johan Victor (1879-1933), Dan. Arctic explorer, b. Jakobshavn, Greenland, son of a missionary, and educ. at Copenhagen Univ. He visited Lapland, 1901, and accompanied the Mylius-Erichsen (1902-4) expedition to Kap York which studied the Eskimo. R. himself made ethnographical expeditions in 1905-8, 1909, and 1910. In 1912 he crossed from Inglesfield Bay of Danmark Fjord and Independence Fjord, returning in 1914 to Wolstenholme Fjord, and in 1916-18 to NW. Greenland, with the second Thule Expedition. From 1921 till 1924 he journeyed from the W. of Baffin and westward to the NE. corner of Siberia. He describes this latter journey in *Across Arctic America*, 1927. An important series of results were also pub. In 1931 he reconnoitred SE. Greenland in a small motor-vessel,

travelling over 2500 m., and was in Greenland again in 1933.

The champion of Polar Eskimos (his mother was of Eskimo descent), R. estab. an Eskimo settlement at Thule (q.v.) (NE. Greenland), in 1910, with the aid of the Dan. Missionary Society; he set up a code of laws for local government, and instituted social services.

His works appear mainly in Danish, but the following have been translated: *Across Arctic America*, 1927, *Eskimo Folk Tales*, 1921, *Greenland by the Polar Sea*, 1921, *The Mackenzie Eskimos*, 1942, *The People of the Polar North*, 1908. Peter Freuchen's life appears in Fr. as *Dans le désert blanc avec Knud Rasmussen*, 1949.

Raspberry (*Rubus idaeus*), prickly shrub with pinnate leaves, white and hoary beneath, and drooping white flowers, followed by red or white fruits, which are highly valued for dessert, preserves, and other culinary uses. R.s are propagated from seed or from suckers planted in the autumn in a deep rich loam, with which manure has been liberally incorporated. The plants are generally set in rows about 5 ft apart each way, and are trained to poles or to a trellis of wire. After the fruit has been gathered the old fruiting wood is removed to the ground, and the young canes thinned out to from 5 to 8 per stool. The plants are surface rooters, and therefore the ground must not be dug around them, though frequent hoeing is desirable, and an ann. mulch of manure should be forked into the soil in autumn; while the fruit is being produced a liberal watering with liquid manure is desirable. Autumn-fruiting R.s are of different habit, bearing fruit on shoots of the current season's growth. Hence all shoots should be cut down in Jan.

Raspe, Rudolf Erich (1737-94), Ger. scientist, antiquarian, and writer, b. Hanover, and educ. at Göttingen Univ. He was versatile and widely read, the subjects of his pub. works including volcanic geology, Leibnitz as a mathematician, an introduction of Percy's *Reliques*, and a study of Ossian that became one of the pioneer works of the Gothic revival in Germany. His book entitled *Baron Münchhausen's Narrative of his Marvellous Travels and Campaigns in Russia* appeared in England in 1786, and it is for this fantasy that he is remembered. See MÜNCHHAUSEN.

Rasputin, Grigoriy Yefimovich (c. 1870-1916), Russian mystic and charlatan, who played a fatal rôle during the last years of the empire. A Siberian peasant by birth, R. received no education and had no occupation. He was ignorant and licentious, but was credited by all those who met him with powers of hypnotism and clairvoyance. Introduced to the imperial court in 1905, he apparently on sev. occasions saved the life of the heir to the throne (who suffered from haemophilia) and thus gained an unlimited influence over the empress (see ALEXANDRA FEODOROVNA). During the First World War, when Nicholas II was at the front, R. practically ruled Russia through

ministers appointed on his recommendation after he had secured the dismissal of all the liberal ministers. This scandalised the public, and after all attempts to remove R. had failed he was murdered at a dinner-party by 2 relatives of the emperor and the leading Right-wing Duma member Puriishkevich. See M. V. Rodzianko, *The Reign of Rasputin*, 1927; Sir B. Pares, *The Fall of the Russian Monarchy*, 1939.



GRIGORIY RASPUTIN

E.N.A.

Rassam, Hormuzd (1826-1910), Assyriologist, b. of Christian parents at Mosul, in N. Mesopotamia. He was agent and overseer for Layard in the excavations at Nineveh, 1845-54. After studying at Magdalen College, Oxford, R. returned to archaeology, finding at Nineveh the palace of Ashurbanipal. Made Brit. resident at Aden, in 1864 he was sent by the Brit. authorities on a mission to King Theodore of Abyssinia, and was held prisoner, 1866-8, until released by Napier's expedition. He conducted excavations for the Brit. Museum in Assyria and Babylonia, 1876-82. He wrote *The British Mission to King Theodore*, 1869, and *Asshur and the Land of Nimrod*, 1897.

Rassemblement du peuple français (R.P.F.), see FRANCE, *History*.

Rastatt, or **Rastadt**, Ger. tn in the Land of Baden-Württemberg (q.v.), on the Murg, near the Fr. frontier, 45 m. W. by N. of Stuttgart (q.v.). Congresses were held in the tn in 1714, at the end of the

War of the Sp. Succession, and in 1797-9 between France and Germany. In 1849 it was the chief stronghold of the Baden revolutionists. R. was sacked during the Thirty Years' War (q.v.), and again in the wars of Louis XIV (q.v.), and it was severely damaged during the Second World War. There is a rococo palace, and sev. old churches. Metal goods, tobacco, and lace are manuf. Pop. 18,000.

Rastell, John (c. 1475-1536), printer and author, b. London. He first practised with success at the Bar, and then estab. a printing business about 1514. His chief work is *The Pastyme of People, the Chronycles of dyvers Realmys and most specially of the Realme of England*, 1529, dealing with early hist. down to the time of Richard III. He also wrote a morality play entitled *A New Interlude and a Mery of the IIII Elements*, 1591, and sev. works of a legal character.

Rastell, William (c. 1508-65), printer and judge, son of the foregoing, b. in London. In 1534 he abandoned the printing business and read for the law, being made a judge in 1558.

Rastenburg, see KETRZYŃ.

Rastyapino, see DZERZHINSK.

Rat, name for a number of rodents, chiefly larger members of the genus *Rattus*. The Common Brown, Norway, or Hanoverian R. (*R. norvegicus*) is believed to have originated in China, but is now distributed over a very large area of the world, nearly always occurring in close association with man. Almost as widely distributed is the Black R. (*R. rattus*), which also was probably a native of Asia, having gradually spread westwards till it reached Britain, where for some centuries it was the prevailing species. The Brown R. began to arrive in considerable numbers during the Hanoverian dynasty, and has gradually displaced the other species, which now would probably be quite extinct in Britain but for frequent reintroduction by ships. As the name suggests, it is a rich black in colour, though the under parts of the body shade off to a dark ash. The black colour is not alone a sufficient means of identification, as occasionally brown varieties occur, while, on the other hand, melanism in the brown R. is not unknown. The black R. has larger and more prominent ears than the other, and its tail is long and fine. The snout is longer and more pointed, the upper jaw projecting beyond the lower to a greater extent. Its general build is slimmer and more graceful, and its disposition considerably less savage, and consequently it and its varieties are more commonly kept as pets. The prin. checks on R.s, which are estimated to rob industry of some millions of pounds annually, are owls, cats, poisons, and the practice of ratting. For this, white bitch ferrets, strong and well-nourished (though ravenous on the day), and rough-coated terriers with good noses and game dispositions are essential. Both species may carry fleas which transmit bubonic plague to human beings.

Research into the problems of R. in-

festation was spurred by war-time needs to preserve food and supplies, and information about the numbers and the best methods of extermination was required. The problem is a responsibility of the Ministry of Agriculture's Infestation Control Div. Occupiers of premises and land may be fined for neglecting to destroy R.s. See H. Zinsser, *Rats, Lice, and History*, 1943.

Rata (*Metrosideros robusta*), New Zealand tree which in its native habitat attains a great height, and bears red flowers. Its hard timber has many uses, in shipbuilding, and for Maori clubs and canoe-paddles.

Ratae *Coritanorum*, see LEICESTER.

Ratafia, cordial flavoured with fruits, or the kernels of fruits, and used generically to include sev. fruit liqueurs. The fruits, apricots, cherries, strawberries, peaches, plums, or their kernels, are crushed and steeped in alcohol or eau-de-vie, distilled, and flavoured with sugar or various spices. Some varieties are obtained by infusing the fruits entire. See LIQUEURS.

Ratak, see MARSHALL ISLANDS.

Ratany, see RHATANY.

Ratatskr, see YGGDRASILL.

Ratcliff (the name means 'red cliff'), riverside par. in the bor. of Stepney, London, connected since medieval times with the maritime history of England. Frobisher and Willoughby sailed from Ratcliff. It was notorious in the 18th and early 19th cents. for its drinking dens for sailors.

Ratel, or Honey Badger (*Mellivora*), genus of carnivorous animals. The body is powerfully built, the legs are short, with long fossorial claws. The tail is short, and the ears are rudimentary. The colour is ashy grey on the upper surface and black on the under parts, an interesting contrast with the usual protective colouring. A white strip runs either side from the head to the tail, dividing the grey and black. Though closely resembling one another, 2 species are commonly recognised: the Indian R. or Badger (*M. ratel*) occurs throughout India, feeding on a variety of small animals and also on honey; the Cape R. (*M. capensis*) is widely distributed throughout S. Africa. Like the skunk, the R. produces a foul-smelling secretion from its anal glands.

Rates and Rating. The system of rating at present in operation in England has its foundation in the Poor Relief Act of 1601, which introduced local taxation for poor relief. A liability to be rated was imposed on every inhabitant, parson, vicar, every occupier of lands or houses, etc. The office of par. overseer was created, and these officers, who administered poor relief, were the rating authority for each par. In course of time a number of rates were levied in addition to the poor rate, such as the bor. rate, general dist. rate, and highway rate, but the principles laid down for the levying of the poor rate formed generally the basis upon which all these rates were levied, and

these received little alteration, except in the metropolitan area, until the passing of the Rating and Valuation Act, 1925, which abolished overseers and transferred their rating functions to bor., urb., and rural dist. councils. In 1869 the rating practice was revised for London, owing to the phenomenal growth of the pop., and as a result the par. disappeared as the unit of local government in the metropolitan area. The 1925 Act estab. a single general rate in each bor., urb., and rural dist., and abolished the par. as the unit for rating generally, but the latter still retains limited powers of rating by pre-empting the rating authority (see LOCAL GOVERNMENT).

The enlargement of the unit of administration has as its object the attainment of uniformity, and, to assist, assessment areas were constituted consisting of one or more rating areas grouped on the principle of convenience of size and simplicity of administration. The Act also set up a central valuation committee for England and Wales and co. valuation committees for each administrative co. to act in an advisory capacity to rating authorities. The latter committees were charged with the duty of taking such steps as they thought fit for promoting uniformity in the principles and practice of valuation and assisting rating authorities and assessment committees in the performance of their valuation functions. They have since been abolished.

Co. councils have no power to levy rates, but obtain their funds by issuing precepts (i.e. demands) upon the rating authorities in the co., requiring them to levy and pay over the proceeds of a specified rate in the £.

The new system introduced by the 1925 Act also provided for a revaluation of all property to secure a more equitable distribution of the burden of rates, since at that time the anomalies of valuation were great. Rateable values were required to be shown in a valuation list, to be revised every 5 years, called a 'quinquennial valuation.' The list was, however, subject to revision during the interim as new properties or new uses arose. The method of valuation introduced was for the rating authority to prepare proposals for the amendment of the valuation list which were submitted to the assessment committee for the area, notice thereof having been given to the occupier. The functions of the assessment committee were to revise the draft lists, to hear and determine proposals and objections by ratepayers, and eventually to approve the list as amended by the committee. The committee had to consider not only the values of property in a particular rating area, but to see that all the rating areas within its jurisdiction were equally and fairly assessed under uniform principles of valuation. A person aggrieved by a decision of an assessment committee had a right to appeal to the court of quarter sessions for the co. or place where the hereditament in question was situated. The Local Government Act, 1948, trans-

ferred the Valuation function to the Board of Inland Revenue through their Valuation Officer and set up new Local Valuation Courts for appeal as described below.

Valuation. The basic principle of all valuations is to estimate the rent at which the hereditament might reasonably be expected to let from year to year if the tenant undertook to pay all usual tenants' rates and taxes and tithe-rent charge, if any, and to bear the cost of repairs and insurance and the other expenses, if any, necessary to maintain the hereditament in a state to command that rent. This is the definition of 'net ann. value' in the Act of 1925. As a temporary measure dwelling-houses are valued on their letting value in 1939.

Ratability. The Act of 1601 mentions *inhabitants* as well as *occupiers*, so that liability to poor rate fell on inhabitants, as such, in respect of their trading profits, whether they occupied property in the par. or not. This legal interpretation of the Elizabethan Act endured until 1840, when the Poor Rate Exemption Act of that year provided that ratability should depend on the occupation of ratable property in the particular rating area. Judicial interpretation of the Act of 1601 exempted any classes of property if not specifically mentioned; e.g. inasmuch as 'coal' mines were mentioned, similarly all other mines were exempted by necessary implication, and sporting rights escaped; but these anomalies were ended by the Rating Act of 1874. Under the present law the occupier of any land or building (except agric.), however used, is liable to be rated in respect of that land or building; similarly, the right to receive the profits from land involves liability to rates, provided the occupation of land is necessary to earning such profits. Exemptions include property in the occupation of the Crown and used for the purposes of the central gov., e.g. police stations and co. courts, but not buildings occupied for the purposes of local government; also churches, chapels, or other premises of the Estab. Church or, if certified, of other denominations; voluntary schools (exempted under the Education Act, 1944); premises occupied by literary or scientific, etc., societies supported by ann. voluntary contributions and certified by the registrar of friendly societies, and certain charities.

The Rating and Valuation (Apportionment) Act, 1928, in conjunction with the Local Government Act, 1929, introduced rate relief for industrial and freight-transport hereditaments to the extent of three-fourths of the rate burden and gave complete relief from rates to agric. land and buildings, other than farmhouses and cottages. This relief is commonly known as *de-rating*, and it was designed to assist productive industry and agriculture, which were experiencing financial difficulties at that time. Rating authorities lost considerable ratable value as a result of this measure, and were compensated to some extent by a system of exchequer grants (see LOCAL GOVERNMENT). Even though ratable liability depends upon

occupation, the owners of some properties, e.g. small properties, are liable to pay the rates, but in such cases the owner recoups himself by charging the occupier a rent inclusive of rates. Rating authorities may by resolution allow discount for prompt payment of rates, and in the case of smaller properties (not exceeding normally £18 ratable value) may where the owner pays the rates give an allowance (called a *compounding allowance*) to the owner. Agreements may be made in respect of premises let for periods less than quarterly whatever the ratable value, and an allowance made of varying percentage according to whether the owner pays the rates, whether the property is occupied or not, or only so long as occupied, or only acts as collector on behalf of the rating authority. See also COMPOUND HOUSEHOLDERS.

Rates are payable on demand, but 7 days notice of any action must be given. Legal action for recovery is not usually taken until towards the close of the rate period. Rating authorities have power to enforce payment of rates by distress warrant obtained from the justices, and if there are insufficient goods upon which to distrain can make application to the justices for the defaulter to show cause why he should not be committed to prison. The Money Payments (Justices Procedure) Act, 1935, empowers the justices to issue a warrant for imprisonment only where on inquiry they are of the opinion that failure to pay is due to either wilful refusal or culpable neglect. Rating authorities can require tenants and lodgers to pay rent direct to the rating authority in discharge of rates owing by the landlord.

Reform of the Rating System. Many suggestions have been made for the reform of the rating system, and schemes for the rating of site values, land values, or capital values and a local income tax have been considered, but as the present system provides a fairly stable source of revenue, little affected by fluctuations in trade, and also fixed or localised in situation, it still remains as the basis for contribution to local-authority expenditure. The valuation machinery has been reformed by the Local Government Act, 1948, and since Feb. 1950 the assessment and valuation committees have ceased to exist and rating authorities have no functions in relation to the preparation and amendment of valuation lists. Draft list procedure has been abolished. Valuation lists are prepared and amended by valuation officers of the commissioners of Inland Revenue. An attempt has been made to obtain uniformity of valuation over much wider areas than hitherto by the application of statutory provisions indicating how the ratable values of dwelling-houses are to be calculated. Valuation courts take the place of assessment committees, and consist of a smaller number of members covering larger areas on a co. and co. bor. basis. These courts are formed from valuation panels, with members selected by the co. councils and co. bor. councils.

Appeals were made to lie to the co. court and not the court of quarter sessions as formerly, but now lie to the Lands Tribunal. These reforms were all directed to obtaining greater uniformity of valuation, especially since exchequer grants in aid of local-authority expenditure are directly linked up with the question of whether or not a co. or co. bor. council had a ratable value per head of weighted pop. below the average for the country.

Probably the reason which prompted the gov. to introduce this reform in the machinery of valuation was that there was an obvious lack of uniformity of assessments throughout the country, and assessments themselves were not a true reflection of the rental value of premises. The First World War brought about a change in the cost of living, so that local authorities were required to provide more extensive services on assessments in the main based upon 1914 rents. This arose from the statutory control of rents immediately following upon the War, and from the valuation of new properties by means of comparison with the assessments of controlled premises and not at the new values of the post-war period. Similar circumstances arose again as a result of the Second World War. This also caused the postponement of the quinquennial valuations. Obviously the failure of ratable values to rise commensurately with the increases in the cost of living, i.e. the cost of services provided by local authorities, meant that the local authorities had to find the money in the only other way possible, namely by increasing the rate in the £.

The total ratable value on which rates were levied in England and Wales in 1955-6 was £361,818,000. Owing to the new revaluations this figure increased 72 per cent for 1956-7 to £622,974,000. An analysis of the types of properties upon which the rates were levied shows the following:

Class of Property	£m.
Domestic	307.8
Shops	89.0
Commercial	85.1
Licensed Premises	14.6
Entertainment	13.1
Public Utilities	14.2
Educational	27.5
Crown Property	15.5
Industrial	39.1
Freight Transport	1.5
Miscellaneous	15.6
TOTAL	£623.0

This total was divided among the local authorities as below:

	£000's
Cos:	
London	104,862
Others	331,079
	<hr/>
	435,941
Co. Bors.	187,008
	<hr/>
	£622,947

The highest ratable value for the cos. was London, £104,862,000, and the lowest, Rutland, £210,262. The highest for the co. bors. was Birmingham, £15,848,277; and the lowest Merthyr Tydfil, £401,907.

The average rates levied in 1956-7 for England and Wales were:

	Rates m the £	Rates per head
	s. d.	£ s. d.
Co. Bors.	16 7	10 17 3
Metropolitan Bors.	13 11	23 4 1
Non-co. Bors.	16 11	11 16 5
Urb. Dists.	16 11	10 8 10
Rural Dists.	15 7	7 13 10

Rate Services. A typical demand note for rates is endorsed with a statement showing how the rate in the £ demanded is made up. It sets out the rate in the £ which would be required to meet the net expenses of each of the prin. services, after allowing for specific gov. grants towards the expenses of certain services (e.g. education, highways, and housing), but without allocation to particular services of the gov. grants under the Local Government Act, 1948. The gov. grants under this Act, being in aid of local gov. expenses generally, cannot be allocated to any particular service; they reduce by the amount shown on the back of the demand note for the general rate the total rate in the £ which would otherwise be demanded.

Rath, a former tn of Rhenish Prussia, now a NE. suburb of Düsseldorf (q.v.).

Rath, in Ireland, prehistoric ringfort, a fortified farmstead. Many were still in occupation in the Dark Ages. When the earthen ring-wall is replaced by stone, the structure is known as a *cashel*. J. Raftery, *Prehistoric Ireland* (1951), pp. 32 ff.

Rathaus, Ger. term (Dutch, *radhuis*) for the seat of tn gov., usually trans. by the Eng. tn hall. In fact, this trans. is historically inaccurate, since in the past, the Ger. R. (like the Fr. *hôtel de ville*) occupied a far more important position than the Eng. tn hall, though their modern functions are more similar. The medieval Ger. and Flem. merchant cities, such as Hamburg, Nuremberg, and Bruges, possessed a degree of autonomy never gained by any Eng. city, even London, in the same period. The R. became a symbol of mercantile sovereignty, and, in the Middle Ages, its size and splendour were regarded as proof of the independence and wealth of its city. Many medieval R.s still exist. They usually conform to a general plan, being distinguished by an imposing central tower, e.g. Bruges, Hamburg, and containing chambers for every dept of gov. They were the seats of justice and commerce, as well as centres of administration, and contained vaults for the city archives and treasure. The R. at Hamburg belongs to the Renaissance period; there is a Gothic R. at Bruges.

Rathbone, Eleanor (1873-1946), social reformer, b. Liverpool. She was educ. at Kensington High School and Somerville College, Oxford. R. helped to found a dept. of social science in Liverpool Univ. and lectured there on that subject. She was the first woman member of the Liverpool city council, the first woman M.P. for Lancashire, and was independent M.P. for the Combined Univs. from 1929. She was closely associated with the movements for raising the status of women, the welfare of children, and, above all, for family allowances, for which she carried on a campaign which resulted in the passing of the Family Allowances Act of 1945. It is for this that she will be chiefly remembered, but the legislation which resulted in widows' pensions and the extension of the franchise to women also owed much to her influence. During the First World War she organised the Soldiers' and Sailors' Families Association. Pubs.: *The Disinherited Family*, 1924, *Child Marriage: The Indian Minotaur*, 1934, and *The Case for Family Allowances*, 1940. See Mary D. Stocks, *Eleanor Rathbone*, 1949.



Staatliche Landesbildstelle, Hamburg
THE RATHAUS, HAMBURG

Rathdrum, tn of co. Wicklow, Rep. of Ireland, 10 m. from Wicklow, set high in the beautiful valley of the Avonmore. Nearby are Glendalough (q.v.) and Avondale (now a forestry school). Pop. 1300.

Rathenau, Walther (1867-1922), Ger. statesman and writer, of Jewish descent. His father, Emil R. (1838-1915) trained as an engineer in Germany and England. Returning to Germany, he organised the A.E.G. (Allgemeine Elektrizitäts-Gesellschaft), which later became a concern of

world-wide importance. Walther R. succeeded his father as president of the A.E.G. in 1915. During the First World War he presented to Falkenhayn, then war minister, an economic plan for countering the allied blockade, and was appointed economic director. After the War he was appointed minister of reconstruction. In 1920 he became foreign minister and negotiated the Rapallo Treaty (q.v.), but was assassinated, 1922. His chief book, *Von kommenden Dingen*, 1917 (trans. into Eng. as *In Days to Come*, 1921), is a criticism of Socialism and a protest against the domination of machinery in the widest sense of the word.

Rathenow, Ger. tn in the dist. of Potsdam, on the Havel, 45 m. W. of Berlin. It was sacked in the Thirty Years' War, and was the scene of a defeat of the Swedes in 1675 by the Elector Frederick Wm. There was severe damage during the Second World War. It has manufs. of optical and precision instruments, and chemicals. Pop. 34,000.

Rathfarnham, vil. 4 m. S. of Dublin, Rep. of Ireland, the gateway to the D. Mts. R. Castle now belongs to the Jesuits.

Rathkeale, mrkt tn of co. Limerick, Rep. of Ireland, on the R. Deel. Ardagh, where the famous Ardagh Chalice (National Museum, Dublin) was discovered, is 7 m. W. Pop. 1500.

Rathlin Island, is. 6 m. off the N. coast of co. Antrim, N. Ireland, opposite Ballycastle, the refuge of Robert Bruce, King of Scotland.

Rathluir (Charleville), mrkt tn, 34 m. N. of Cork, Rep. of Ireland, at S. extremity of fertile plain and near Cork-Limerick border. It has an important creamery industry and a livestock fair. Pop. 1600.

Rathmines, suburb of the city of Dublin, Rep. of Ireland. Pop. of R. and Rathgar, 40,000.

Ratibor, see RACIBÓRZ.

Ration: 1. *In the Navy*. The victualling of the fleet was originally in the hands of contractors, who were paid a fixed daily sum for every man in the fleet. In the course of time, however, this duty was taken up by the Admiralty itself, and the chief victualling depot was estab. at Deptford, where it remained until the Second World War, when severe bomb damage caused it to be largely abandoned. The prin. depot is now at Portsmouth. At the beginning of the 17th cent. the R.s of the sailor were fixed, and amongst other allowances he was given a gallon of beer per diem. This remained in force until the end of the 18th cent., when grog was introduced, the allowance being $\frac{1}{2}$ pint, and this was still further reduced to 1 gill when evening grog was replaced by tea. This constitutes the present R., which is not allowed to officers or men under 20. Victuals, which the men were allowed but did not actually take, were called savings, and a small monetary allowance was given in place of them. To overcome the inherent monotony of the food, a new system was estab. in 1906 which intro-

duced a standard modified R. of the basic items together with a monetary allowance. The first experiments in what is known as general messing, which displaced the standard R., were first started in the *Dreadnought* in 1907, but the system (whereby a supply officer is responsible for providing the full messing based on an authorised maximum overhead rate) did not develop fully until after 1918, when it expanded rapidly throughout the whole fleet. It is in general use to-day, and in large ships meals are served on the cafeteria system in special dining-halls. Officers, if they so prefer, may be credited with a victualling allowance instead, by which sufficient money is given to them to arrange their own dietary or to obtain gov. provisions on repayment. In a few of the older and smaller ships this victualling allowance also applies to ratings. A daily issue of lemonade made from lemon powder and sugar to every person on board may be given on the requisition of the medical officer and approved by the captain. Persons employed in the engine-room and stokehold may also receive, in addition, a ration of oatmeal and sugar; those exposed to unusually severe weather an extra issue of bread, biscuit, and meat; and those on night duty are supplied with tea or cocoa. Special issues are also given to men in submarines, surveying vessels, and small ships employed in extreme climates.

2. *In the Army.* The soldier's remuneration in most armies has always consisted of 3 elements: pay, R.s, and free quarters. If the last 2 are not provided, or fall short of what is to be regarded as the normal scale, this is adjusted, in theory at least, by an increase in the first. Bartering and sale of R.s, to civilians will always go on where civilians are underfed and soldiers are in more than usual need of cash or a change of diet. At certain times and places this has been recognised by the military authorities, and the Ger. *Kommissbrot* and Fr. *pain commis* owe their name to the fact that they were bought by housewives at the barrack gate from soldiers who had just drawn their R.s. R.s in the Brit. Army (formerly 'commons' or 'allowance') consisted for a long time of beef, bread, and beer. Small beer was called 'Act of Parliament' in the Army during the Napoleonic wars, because by the ordinances then in force each man was entitled to 5 pints of it daily. In recent times R. scales have been of 2 main kinds, 'bulk rations' issued at home or in back areas abroad, the basis of which is fresh meat, bread, and vegetables; and 'preserved rations' issued on active service in forward areas where fresh meat is supplanted by canned beef and bread by biscuits.

In peace-time the basic R.s are issued by the R.A.S.C. (Irish and Scottish regiments are entitled in their basic R. to extra quantities of potatoes and oats respectively in lieu of bread or flour), and a cash allowance is made for other items of diet to be bought by the president of the Regimental Institute or his deputy,

the messing officer, either from the N.A.A.F.I. (q.v.) or from the local sources. Allowances for the purchase of extra foodstuffs are of great antiquity. Rom. soldiers drew 'salt money' (*salarium*, whence the modern *salary*).

Various kinds of preserved R.s packed in small quantities and containing all the elements of a day's meals were introduced during the Second World War, ranging from 'assault R.s' for 1 man for 24 hours issued to men landing on combined operations to 'composite rations' for the use of tank crews or small sub-units likely to be out of touch with their own supply echelon for some days.

3. *In the R.A.F.* There is little difference in the provision and supply of R.s in the R.A.F. and that of the Army, from whom the system was inherited. This was no doubt partly due to the fact that one of the forerunners of the R.A.F., the Royal Flying Corps, was an integral part of the Brit. Army, and, as such, had automatically followed general army procedure. On the formation of the R.A.F. as a separate service much of this procedure was retained, including the system of rationing, which, apart from minor differences in administrative arrangements, is followed in broad principle to-day. While it may be said that the War Office are the general providers of foodstuffs for the R.A.F., only a certain proportion of the daily requirements are drawn from the R.A.S.C., the remainder being obtained from the N.A.A.F.I., or from R.A.F. unit farms or gardens, where these are estab. The value of the commodities is charged against a daily monetary entitlement for each man. The aim is to provide well-balanced, palatable, and varied meals built up to a standard caloric value. Problems of feeding which are peculiar to the R.A.F. include special diets for air-crew on long-distance flights, such as distant bombing raids, 'in flight' meals on the service-scheduled routes, and feeding in connection with air-sea rescue arrangements. For many of these tasks research has produced 'emergency flying R.s,' special packs of R.s in easily portable containers. The object of these packs is to contain in as little space as possible the maximum amount of nourishment and sustenance, compressed, block, and tabloid foods being employed. Water is issued in sealed cans, and, in addition, when considered necessary, water-purifying tablets are included in the packs. Provision has to be made in emergency meals of this type for use in extremes of temp. and climate.

On civilian rationing see FOOD CONTROL, BRITISH, IN WARTIME.

Rationalisation of Industry. The application of the most efficient methods in production, distribution, and transport. In its various uses it would include ample modern equipment; mass production; co-operative effort; evenness and regularity of output; scientific organisation and management. In practice, the purpose is often to maintain or raise profits by eliminating competition. Politicians,

business magnates, and commercial organisers use the term with such widely different interpretations that there is a danger of its being rather an illustrative phrase than the definition of a precise policy. Probably it is most clearly understood and most properly applied in relation to such great public concerns as the railways, or the greater industries, such as coal and the cotton trade. Some of the larger industries that before the Second World War had fallen on evil times owed part of their decline to antiquated methods, wasteful overlapping, and the handicap of unscientific equipment and machinery. In these cases, too, R. of I. implied a definite economic policy. But in the majority of cases to which the words were, in recent years, commonly applied it is doubtful whether the phrase has any such precise meaning. The expression is loosely used to justify commercial policies of doubtful advantage to the community. Combines to maintain prices, manipulation of shares to control markets, crushing out weak opponents by underselling, gaining special legal privileges for particular groups of traders, and other such acts commonly associated with trusts have been made to appear almost benevolent acts under the new label of R. of I. Rationalisation has been carried to its greatest extreme in the U.S.A., especially in the motor-car and steel plants. Next to the U.S.A. in this respect stands Germany. See also PRODUCTION AND PRODUCTIVITY.

Rationalism, primarily a philosophical movement, but its results were felt principally in theology. It is an attitude rather than a definite doctrine; it assumes the superiority of reason over sensation as a medium of cognition, asserting reason to be an independent source of knowledge and the final standard of criticism in philosophy, aesthetics, and religion alike. R. is opposed to irrationalism, which rejects or ignores all the conclusions of reason, relying upon emotion and the dictates of practical convenience. Philosophic R. was first formulated by Descartes in his *Discours de la méthode*, 1637; he contended that there are elementary *a priori* concepts from which the whole of knowledge can be deduced mathematically—as opposed to those schools who contend that the mind is blank until some sense-impression of an object is conveyed to it. In other words, R. claimed that true knowledge can be deduced by ratiocination rather than by such empirical processes as intuition and sense-perception. Certain compromises between the two schools were attempted; Locke, for instance, insisted on the validity of R. and empiricism alike. But no such middle course was adopted by Descartes, who started off with such ideas as are fundamentally certain, reducing them to two categories: (1) clear, i.e. intuitively and manifestly existent, and (2) distinct, i.e. having a precise absolute value and also a precise value relative to other ideas. The whole rationalistic process was accepted also by Spinoza, who

constructed his *Ethics* (pub. 1677) on mathematical lines of axioms and postulates, definitions, and propositions; by Leibnitz, who advanced the idea of a logic and dialectic that should express philosophy in the same rational method that his calculus expressed truths in pure mathematics; by Wolff, who attempted to formulate knowledge on the lines suggested by Leibnitz. Kant showed the falsity of the mathematical analogy, and demonstrated that reason alone can lead only to tautology, since a concept has its individual limits. Later attempts at reconciliation were made, although not ostensibly, by Hegel and Schleiermacher; and Spencer also used R. as his basis in some respects; but as a purely philosophical force it has had no great advocates since it was refuted by Kant. The theological movement of R. was most strongly in evidence in Germany during the late 18th and early 19th cents. Sporadic outbursts of individual R. can be traced throughout the hist. of the Christian Church, but it was not until the pub. of Lord Herbert of Cherbury's *De veritate*, 1624, and *De religione gentium*, 1645, that a definite theological school of R. arose. In 1754 Hermann Reimarus circulated his rationalistic writings privately; 20 years later Lessing (q.v.) pub. them as fragments from the Wölffenbüttel library, of which he was then in charge, as an assault on the Hamburg orthodox Lutherans. Johann Semler (1728-94) was the chief figure of the reaction, however; his attack was temperate, for whilst relegating the Bible to the ranks of all oriental symbolical writings of the same period, and urging that the true religion was an individual soul-force and not a universal dogmatic creed, he recognised the value of the Church from the sociologist's point of view as a disciplinary agent. Michaelis, Eichhorn, and Paulus followed Semler, Paulus being the exponent of the vulgarised 'rational morality' of Kant, which tended to a somewhat crude asceticism. Theological R. is opposed to supernaturalism and to rationally indefensible dogma, and refuses to accept Scripture as an infallible hist. of divine revelation. David Strauss, Renan, and Nietzsche brought what was then considered vast philological knowledge to bear on the subject, with the result that not only was the O.T. rejected, but the divinity of Jesus Christ was considered as disestablished, and He was regarded as a sectarian teacher pure and simple. This kind of thing was associated with the Ger. 'higher criticism,' and has now been discredited. See W. E. H. Lecky, *History of Rationalism in Europe*, 1870; J. F. Hurst, *History of Rationalism*, 1901; C. Watts, *The Meaning of Rationalism*, 1905; and J. McCabe, *A Rationalist Encyclopedia*, 1948.

Rationing of Food, see FOOD CONTROL, BRITISH, IN WARTIME.

Ratisbon, see REGENSBURG.

Ratitae, Curores, or Palaeognathae, one of the 2 main divs. of birds which once constituted an important group, but

which is now represented only by the ostrich, rhea, emu, cassowary, and apteryx. They are all flightless, and their breast-bone is keel-less or flat.

Ratnagiri, tn of Bombay State, India, 136 m. S. of Bombay, on the Indian Ocean coast. Here King Thibban of Burma was interned, and *d.* in 1916. Here also were b. 2 leaders of the Indian nationalist movement, Gangadhas Tilak and G. K. Gokhale.

Ratnapura, tn in the is. of Ceylon, 39 m. ESE. of Colombo. Rubies and sapphires are found in its rivs., and these and other gems are also mined.

Ratnavali ('The Pearl Necklace'), Sanskrit drama of the 7th cent. ascribed to King Shri Harsha, also to Bana and to Dhabaka. The heroine is Sagarika (owner of the necklace), a princess of Ceylon. See Cappeller's ed. in O. Böhtlingk's *Sanskrit Chrestomathie*, 1845. There are trans. in Eng. by H. H. Wilson, 1835, in Ger. by Fritze.

Rat-Portage, see KENORA.

Rattan, see ROATAN.

Rattan-Cane, see CALAMUS.

Rattany, see RHATANY.

Ratti, Achille, see PIUS (popes), *Pius XI.*

Rattigan, Terence Mervyn (1911-), dramatist, b. London. He was educ. at Harrow and Trinity College, Oxford. During the Second World War he was a gunner in the R.A.F. In 1936 he scored a success with his ingenious comedy *French Without Tears*. Others of his plays are *After the Dance*, 1939, *Flare Path*, 1942, *While the Sun Shines*, 1943, *Love in Illness*, 1944, *The Winslow Boy*, 1946, *The Browning Version*, 1948, *The Deep Blue Sea*, 1952, *The Sleeping Prince*, 1953, and *Separate Tables*, 1954.

Rattlesnake Root, see SENECA.

Rattlesnakes, or Pit Vipers (Crotalinae), sub-family of viperine snakes found only

of making a loud noise. The head is large behind, and bears a characteristic depression or deep pit on each side of the face between the eyes and the nostril. The common R. (*C. durissus*) is now restricted to the SE. of N. America, though once widely distributed. It grows to about 8 ft. in length; the body is ash colour above, with irregular cross-bars and yellow flanks and vertebral line. It is a sluggish reptile, living on rodents, and rarely attacks human beings unless molested. Other species are *C. horridus*, which is more widely distributed in the U.S.A., the large diamond R. of Florida and Mexico, and *C. terrificus*, also abundant in Central America. The venom of R. is usually fatal, but not invariably. The wild hogs, which are their chief enemies, generally escape serious harm from bites owing to their thick layer of fat. The flesh of R. is innocuous and edible.

Ratzeburg, Ger. tn in the Land of Schleswig-Holstein (q.v.), 50 m. SE. by S. of Kiel (q.v.), built partly on an is. in Lake R. It has a Romanesque cathedral (1154), and another church, also, dating from the 12th cent. The tn is a popular health resort. Pop. 12,000.

Rauch, Christian Daniel (1777-1857), Ger. sculptor, one of the most noted of the 19th cent., b. Arolsen, Waldeck. In 1790 he was apprenticed there to the court sculptor, Valentin, and 5 years later became assistant to Kuhl, court sculptor at Kassel. In 1802 he exhibited his first statue, 'Sleeping Endymion and Artemis.' Soon after, he went to Rome, where he stayed for 6 years, his art being influenced by Thorwaldsen. His early works consist of classical, and poetical statues, groups, reliefs, etc., but he excelled in portrait-busts, statues, and monuments. He was the founder of the Berlin school of sculpture. His crowning work was the colossal monument of Frederick the Great in Berlin, an equestrian statue in bronze surrounded by groups of generals and soldiers. Other works are the statue of Albrecht Dürer in Nuremberg, and statues of Blücher, Luther, and Schiller. See lives by F. and K. Eggers, 1873-91; E. D. Cheney, 1893; H. Mackowsklj, 1916.

Raudnitz, see ROUDINCE.

Ravalliac, François (1578-1610), Fr. assassin, b. Tournes, near Angoulême. He was a schoolmaster for a time, and later a member of a religious order, from which he was expelled. A fanatical supporter of the Catholic League, he assassinated Henry IV of France (1610), and was put to death by torture.

Ravel, Maurice (1875-1937), Fr. composer, b. Clouère, Basses-Pyrénées, studied at the Paris Conservatoire, among his masters being Pessard, Gédalge, and Fauré. He was refused the Prix de Rome, but the indignation this provoked drew much attention to his work, and he made a great reputation and a comfortable living without ever holding an official musical post. He was a member of the Legion of Honour, and an Hon. D.Mus. of Oxford. R. was a descendant



RATTLESNAKE

in America. The R. proper have the end of the tail made up of a number of horny flat rings, which are loosely connected together, and are capable when vibrated

of Couperin and Rameau. His genius is witty, subtle, and emotionally restrained, and he combines a deep-rooted classicism of form with the boldest experiments in harmony; especially notable and delightful are his rhythmic figures. His most important works are the opera *L'Heure espagnole*, 1907; *Daphnis et Chloé* (Diaghilev's ballet, 1909); *La Valse*, the remarkable string quartet, the Trio, the violin and cello Sonata, many pianoforte works, including *Jeux d'eau*, the Sonatina, *Miroirs*, *Gaspard de la nuit*, *Le Tombeau de Couperin*, and the popular orchestral work *Bolero*. After the death of Debussy in 1918 R. was regarded as the most representative of Fr. composers. But except for the ballet opera *L'Enfant et les sortilèges*, 1924, and two piano concertos, 1931, he abandoned the larger forms and concentrated on small-scale works notable for finish of detail. See studies by R. Manuel, 1938; M. Roland, 1945; and N. Demuth (Master Musicians), 1948.

Ravelin, see FORTIFICATION.

Raven (*Corvus corax*), one of the largest of the passerine birds, widely distributed in the N. hemisphere, but rare in Britain on account of its persecution by farmers and gamekeepers, whom it undoubtedly robs of numbers of young birds. It is about 26 in. long, and has a wing expanse of nearly 40 in. The plumage is dense black, glossed with purple; the beak and mouth, tongue, legs, and feet are also black. The nest is built in cliffs or in the fork of a tall tree, and is a bulky structure. In it are laid 4 or 5 pale-green eggs spotted with brown. The male assists in incubation. The R. is a mimic, and, though mischievous, readily tamed, often living to a great age as a pet.

Raven-Hill, Leonard (1867-1942), painter and illustrator, b. Bath. Educ. at Bristol Grammar School and Devon Co. School, he studied art at Lambeth, and in Paris under Bouguereau and Aimé Morot. He exhibited at the Salon, 1887, and at the Royal Academy, 1889, but was most widely known through his drawings for *Punch*, beginning 1896. In 1910 he was made political cartoonist on the death of Lindley Sambourne. Among his works was the illustration of Kipling's *Stalky and Co.*

Ravenglass, small fishing-port of Cumberland, England, 18 m. SSE. of Whitehaven, on the Esk estuary. R. was the site of a Rom. fort; off the shore is a well-known gullery, a breeding ground for terns and black-headed gulls. Pop. 250.

Ravenna: 1. Prov. of Italy, in E. Emilia-Romagna (q.v.). It is mainly part of the great plain of N. Italy, but has hills of the Apennines (q.v.) in the extreme SW. There is a coast-line on the Adriatic. The chief rivs. are the Savio, Ronco, and Montone. The prin. tns include R., Faenza, Lugo, and Bagnacavallo (qq.v.).

2. It. city, cap. of the prov. of R., 42 m. E. of Bologna (q.v.). It stands on the site of *Clavis*, an important Adriatic naval base in the time of Augustus (q.v.);

the sea having receded, R. is now 6 m. from the coast, to which it is connected by canal. In AD 404 Honorius (q.v.) transferred the seat of the W. Empire to R., and after the barbarian invasions it remained the cap. under Odoacer and Theodoric the Great (q.v.). In 540 it was conquered by Belisarius (q.v.), and from 553 until 752, when it was sacked by the Longobards (q.v.), it was the seat of exarchs of the Emperor in Constantinople (see BYZANTINE EMPIRE). In 756 Pépin the Short (q.v.) forced the Longobard king, Aistulf (q.v.), to bestow the exarchate upon the Pope (see CHURCH, STATES OF THE). In 1272 the tn became a dukedom of the da Polenta family, in 1441 it became subject to Venice (q.v.), and in 1509 it again became part of the papal states. In the celebrated battle of R. in 1512 the Fr. defeated the Holy League, but lost their leader, Gaston de Foix (q.v.). During the Second World War the city was captured by the Eighth Army (q.v.) on 5 Dec. 1944 as the result of a brilliant outflanking move. R. has been an archbishopric since 438 (R. and Cérvia, q.v.) and has many buildings of that age, including an octagonal baptistery. The present cathedral, however, is modern, dating from the 18th cent. The beautiful 6th-cent. mausoleum of Galla Placidia (sister of Honorius) is decorated inside with some of the splendid mosaics for which R. is famous; among other structures similarly decorated are the churches of S. Vitale (530) and S. Apollinare Nuovo (526). Beside the church of S. Francesco (partly 5th cent.) is the tomb of Dante (q.v.), and outside the tn is the 6th-cent. mausoleum of Theodoric. R. has museums and picture galleries, and an important library (1707). There is a large trade in agric. produce, wine, and oil, and there are silk, musical instrument, pottery, and agric. implement industries. Pop. (tn) 36,700; (com.) 91,550. See ITALIAN ART; and see E. Hutton, *Ravenna*, 1926.

Ravensburg, Ger. tn in the Land of Baden-Württemberg (q.v.), 72 m. S. by E. of Stuttgart (q.v.). It has anct. towers and gates, and is overlooked by the *Veitsburg* fortress, the bp. of Henry the Lion (q.v.). There are manufs. of textiles and machinery. Pop. 27,000.

Ravenscroft, Thomas (c. 1590-c. 1633), composer, chorister of St Paul's under E. Pearce (Piers). He ed. and pub. the first collections of catches printed in England—*Pammelia Musickes Miscellanie* and *Deuteromelia*, 1609. *Melismata Musicall Phantasies* appeared in 1611; *The Whole Booke of Psalmes*, a collection of psalm-tunes for 4 voices, was produced in 1621-33. Among these, Canterbury, Bangor, and others were composed by R., who also wrote some notable anthems.

Ravenshorpe, suburb of Dewsbury (q.v.).

Ravi, riv. in the Punjab, forming part of the boundary between W. Punjab, Pakistan, and E. Punjab, India, which rises in the Himalayas and flows into the Chenab. Length 450 m.

Ravilious, Eric (1903-42), engraver and water-colour artist, b. London. He was educ. at Eastbourne, and taught at the Royal College of Art. He illustrated eds. of the Golden Cockerel and Nonesuch presses, and made the decorations for Everyman's Library. His engravings are characterised by a strong sense of pattern. In the Second World War he became a war artist, and lost his life while flying from Iceland in 1942. See R. Harling, *Engravings by Eric Ravilious*, 1946.

Raw Materials. In old text-books of political economy this term is not well defined, its meaning being regarded as self-evident. In the 1899 ed. of Paine's *Dictionary of Political Economy* the subject is altogether omitted. Generally speaking, R. M. may be said to be the basic or essential materials of manufacturing processes, the commodities in their natural unwrought state and not yet subjected to any process of dressing or manuf.; but it is obvious that a thing which may be included among R. M. to-day may to-morrow be transferred to the category of finished products; e.g. original R. M. are classed as finished products whenever there is a marketable substitute or synthetic product. The importance of R. M. in polemics to-day arises from the realisation of the decisive part played by them in the waging of war, e.g. crude oil and certain metal alloys, while derivatively the problem of obtaining and distributing more or less limited supplies of R. M. (and food) among the starving and suffering peoples of the world after the War gradually came to be recognised as the most serious one facing the post-war statesman and administrator; and even before the Second World War broke out, the so-called 'Colonial Question' focused world attention on R. M. through the implicit assumption that the 'have-not' nations were inequitably deprived of access to R. M. and that the 'haves' were monopolists of the R. M. obtained from tropical dependencies. This article will consider the question of the international control of R. M. and the influence of substitutes in the economies of R. M.

International Control of Raw Materials. The workers' representatives and the International Labour Office, soon after the First World War, strove to move the League of Nations to compel something in the nature of an equitable distribution of R. M., because they saw that natural inequalities allowed some countries to possess mineral riches or other valuable natural resources while others were completely lacking in them. But though strenuous efforts were made to secure some kind of reform, the League's Economic and Financial Commission did not think that any scheme for international control of the distribution of R. M. could be operated without fixing prices and allocating supplies on some principle of rationing and, in their opinion, that necessarily involved international control of the whole internal life of the countries concerned. Nor again was there any

criterion by which an international office or body could fix a reasonable ratio of any raw material to be allowed to any country. The Genoa Conference of 1922 (q.v.) considered the question, but did no more than adopt a resolution advocating abolition of import and export restrictions and prohibitions, and admitting the right of states freely to dispose of their natural resources. Various forms of international control have been applied to, or proposed for, a great variety of commodities, including aluminium, artificial silk, butter, cinchona bark, coal, cocoa, coffee, copper, cotton, diamonds, lead, maize, mercury, nitrates, oil, olives, opium, pepper, platinum, potash, quebracho, rubber, silver, sisal, steel, sugar, sulphite pulp, sulphur, tea, tin, timber, tobacco, whale-oil, wheat and other cereals, dairy produce, wine, wool, and zinc. The principal object of these restriction schemes, however, was not in any way to secure equitable distribution among the consumer countries, but, by controlling the exportable quantity, to secure a remunerative price to the producer. The consumer was barely considered and, in the matter of rubber restriction, it is not surprising that, late in the operation of the second restriction scheme since the First World War, the Rubber Regulation Committee had to agree to the appointment on its board of an Amer. representative, the U.S.A. being by far the largest consumer of rubber.

Synthetic 'Raw' Materials. The world's R. M. will increasingly be faced with the threat of substitutes. The extent to which new materials, developed by technical science or chemistry, are used in the factory will always afford evidence as to whether the new product is a serious competitor of original R. M. To-day there is hardly a raw material in the world for which a substitute has not been found; many of them are even now an improvement on the original R. M., although in many cases the manufacturing costs are very high. Substitute materials are important not only in war but for the whole of the future development of economy. Science has advanced so far that it is able to produce new and exceedingly valuable materials out of apparent rubbish, and Brit. scientific and industrial circles have taken the question of substitutes seriously. Metals have been replaced by plastics, hard glass, and aluminium alloys; plantation rubber by buna; crude oil by synthetic fuels; wool by casein and glass; cotton by staple fibre; and attempts are being made to find an artificial leather or to substitute fish-skins for real leather.

Post-war Requirements. After the end of the Second World War, the combatant nations suffered from a serious shortage of R. M. Purchasing commissions set up during the War bought raw-material stocks for the post-war period and stored these stocks in the U.S.A., whence they were released as soon as the United Nations were sure that they would be used for the work of healing and not for their destruction.

Raw Materials and the Atlantic Charter. At the 1919 peace conference the victor powers omitted economics from their considerations altogether (apart from reparations), with the consequences which Lord Keynes predicted in his *Economic Consequences of the Peace*. Mindful of this omission, the authors of the Atlantic Charter (q.v.) promised all nations, victors and vanquished alike, access to R. M. Yet, in fact, the charter only promised them what, with a few minor exceptions, they already had. So long as the British, American, Dutch, and other colonial powers were prepared to take any people's money for their colonial tea, rubber, tin, coffee, copper, nickel, etc., and charge the same prices all round, the so-called 'have-nots' had no real ground of complaint other than might spring from wounded prestige. The trouble in the past has been, not that R. M. and food-stuffs were not available, but that they were made inaccessible by tariffs, quotas, or other trade restrictions, or that the peoples who needed them had not the means to pay for them. The world R. M. problem would largely be solved (or at least greatly reduced), therefore, by liberalisation of international trade. See also F. E. Lawley, *The Growth of Collective Economy* (2 vols.), 1938; and P. Lamartine Yates, *Commodity Control: a Study in Primary Products*, 1943.

Rawal Pindi, tn of W. Pakistan. The tn is one of Pakistan's large military centres. It is situated on the N. bank of the R. Loh, 111 m. SE. of Peshawar. It was here that the Sikhs surrendered after the battle of Gujrat, 1849. Prior to the disturbances following partition in 1947, it was one of the regular starting points for the entry to Kashmir by the Jhelum valley.

'**Rawalpindi**,' see NAVAL OPERATIONS IN SECOND WORLD WAR.

Rawdon, or **Rawden**, par. and tn of W. Riding, Yorks, England, 7 m. NW. of Leeds. There is a Baptist theological college, and cloth is manufactured. Pop. 5840.

Rawlings, **Marjorie Kinnan** (1896-1953), Amer. novelist, b. Washington, D.C. Educ. at the univ. of Wisconsin, she married first Charles Rawlings and later Norton S. Baskin. Her novel *The Yearling*, 1938, a tale of a boy and his pet fawn, became a minor classic and was awarded the Pulitzer Prize; others are *South Moon Under*, 1933, *Golden Apples*, 1935, *When the Whippoorwill*, 1940, *Cross Creek*, 1942, *Jacob's Ladder*, 1950, and *The Sojourner*, 1953. The backwoods of Florida, where she made her home, form the setting of many of her books.

Rawlinson, **George** (1812-1902), historian and classical scholar, b. Chadlington, Oxon., brother of Sir Henry R. He was educ. at Trinity College, Oxford. Canon of Canterbury from 1872, he held the Camden professorship of anc. hist. at Oxford from 1861. His most outstanding work is a trans. of Herodotus (1858-62) with his brother and Sir Gardner Wilkinson, a standard work (Every-

man's Library, 2 vols., 1910). Other pubs. include *The Five Great Monarchies of the Ancient Eastern World*, 1862-7, and *History of Ancient Egypt*, 1881, also histories of the Phoenicians and Parthians, and a memoir of Sir H. C. Rawlinson, 1898.

Rawlinson, **Sir Henry Creswicke** (1810-95), soldier and orientalist, b. Chadlington, Oxon. In 1827 he went to India under the E. India Company. In 1833 he was sent to reorganise the shah's troops in Persia, where he studied and transcribed the undeciphered cuneiform texts and copied the trilingual Behistun rock inscriptions. As Consul-General at Bagdad (Iraq) from 1844 he continued these studies and followed Layard as sponsor of excavations in Assyria and Babylonia on behalf of the British Museum, of which he was later a Trustee. (See NINEVEH.) His pub. works have been the foundation of our knowledge of cuneiform inscriptions and the hist. of Babylonia and Assyria, and include *A Commentary on the Cuneiform Inscriptions of Babylonia and Assyria*, 1850, *Notes on the Early History of Babylonia*, 1854, and with E. Norris, *The Cuneiform Inscriptions of Western Asia*, 1861-84.

Rawlinson of Trent, **Sir Henry Seymour Rawlinson**, first Baron, and second Baronet (1864-1925), soldier, elder son of the 1st baronet, Sir Henry Creswicke R. Educ. Eton and Sandhurst, he was commissioned in 1884, in the K.R.R.C. D.A.A.G. to Kitchener in the Sudan, 1898, he served in the S. African war. Commandant of the staff college, 1903-6, he became a major-general in 1909. In 1914 he led the 7th Div. to Ypres, received command of the new Fourth Army in 1915, and organised the prin. Somme offensive of July 1916. After a period on the Versailles Council he returned to lead the reorganised Fourth Army in the last offensives. In 1919 R. carried out the evacuation of Murmansk and Archangel, and received a barony. From Nov. 1920 he was commander-in-chief India. He pub. *The Officer's Notebook*, 1895. See life, from his letters and journals., ed. by Sir F. Maurice.

Rawmarsh, tn of the W. Riding, Yorks, England, 2½ m. from Rotherham, with coal mines, ironworks, brickworks, steel rolling mills, and potteries. Pop. 19,030.

Rawson, tn of Argentina, cap. of Chubut ter. on the Chubut R., about 6 m. from the coast. It derives its name from its founder, who estab. a Welsh colony near its site. Pampa products and fish canning form the prin. industries. Pop. 2500.

Rawsthorne, **Alan** (1905-), composer, b. Haslingden, Cheshire, at first intended to take up dentistry, entered the Royal Manchester College of Music in 1926, later studied abroad, and in 1932-4 taught at Dartington Hall. He has since devoted all his time to composition and produced a comparatively small number of distinctive and highly finished works. They include *Symphonic Studies*, overtures and a symphony, concertos for clarinet, oboe,

violin, and piano (2), chamber music, piano works, and songs.

Rawtenstall, municipal bor. of Lanes, England, 8 m. N. of Bury. It manufs. cotton, felt, and woollen goods, boots and shoes, and has ancillary trades. Pop. 24,950.

Ray, or Wray, John (1627-1705), botanist, b. Black Notley, Essex, took his M.A. degree, and became in turn Gk lecturer, mathematical lecturer, and junior dean of Trinity College, Cambridge.



JOHN RAY

In 1662 conscientious scruples induced him to resign his fellowship. In his earlier life he enjoyed the friendship of Willughby, the zoologist (d. 1672), whose works he ed. In his company he toured for 3 years (1663-6) in Europe, the scientific fruits of his travels being embodied in *Sirpium Europaeorum extra Britannias nascentium Sylloge*, 1694. No small interest attaches to his *Synopsis methodica stirpium Britannicarum*, 1690, his more ambitious *Historia generalis Plantarum* (3 vols.), 1686-1704, and his treatise on zoology, *Synopsis methodica Animalium quadrupedum et Serpentinum Generis*, 1693. The R. Society was founded in 1844. See E. Lankester, *Memorials of Ray*, 1834.

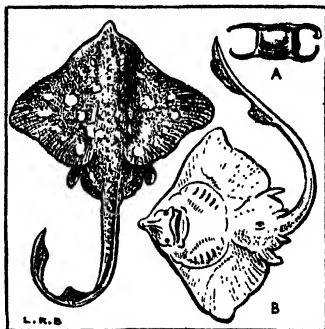
Ray, term applied to elasmobranch fishes, of the order Hypotremata, distinguished by their flattened bodies and enormously expanded pectoral fins. The gill-slits are on the undersurface of the head. In most species, on top of the head, just behind the eyes, is a pair of openings (spiracles), through which water is taken in for respiration.

Ray, Electric, see TORPEDO.

Ray Therapy, see RADIUM.

Rayleigh, John William Strutt, third Baron (1842-1919), physicist, b. Lang-

ford Green, Essex, eldest son of 2nd baron. Entering Trinity College, Cambridge, as a fellow commoner in 1861, he graduated as senior wrangler and Smith's prizeman, 1865, and was a fellow of Trinity College, 1866-71. In 1871 he married Evelyn, sister of Arthur (afterwards Earl of) Balfour. In 1873 he succeeded his father in the barony and was elected F.R.S. From 1879 to 1884 he was prof. of experimental physics at Cambridge, succeeding Clark Maxwell. He presided over the Brit. Association at Montreal in 1884, and succeeded Tyndall as prof. of natural philosophy at the Royal Institution in 1887, resigning in 1905. He was secretary of the Royal Society, 1884-96, and president, 1905-8. He became a Privy Councillor in 1905. R. received the Nobel prize for physics, 1904, the Albert medal of the Society of Arts, 1905, and the Order of Merit at the coronation of King Edward VII, and was chancellor of the univ. of Cambridge from 1908. His work included research in the fundamental electrical units, Boyle's law at low pressures, optics and capillarity, the dynamical theory of gases, hydrodynamics, the mechanics of flight, photography, theory of the telephone, the distribution of alternating currents in conductors, and pure mathematics. It was when experimenting with a view to



RAY (*Raja* sp.)

An egg capsule
Undersurface showing the ventrally placed gill slits

recalculation of atomic weights that he discovered a discrepancy between atmospheric nitrogen (as then extracted) and nitrogen obtained from mineral compounds, which led in turn to his discovery of argon in 1894 simultaneous with its discovery by Sir Wm Ramsay (q.v.). He took considerable interest in psychical research, and was vice-president of the Society for Psychical Research. His works include *Theory of Sound*, 1877-8, *Scientific Papers*, 1903, and an article in the 9th ed. of the *Ency. Brit.* on 'Wave

Theory, which is a compendious treatise on light. An obituary notice occurs in the *Proceedings of the Royal Society*, vol. xviii (1920-1).

Rayleigh, Robert John Strutt, fourth Baron (1875-1947), b. Terling, Essex, physicist, eldest son of 3rd baron; educ. at Eton and Trinity College, Cambridge. He was elected F.R.S. in 1905, and received the Rumford medal in 1920. He carried out important investigations in spectroscopy, but is best known for his measurements of the amounts of radioactive materials present in the earth's crust. These showed that the heat generated by radioactive changes is sufficient to account for the observed flow of heat from the interior to the surface of the earth, and that, contrary to earlier belief, no appreciable cooling of the surface is likely in the course of many millions of years. He also showed that, by measuring the extent to which the end products of radioactive changes had accumulated in rocks since they were laid down, their ages could be estimated. He wrote a life of his father, 1924, and of J. J. Thompson (q.v.), 1942.

Raymond VI, of St Gilles, count of Toulouse, d. 1105, one of the leaders of the first crusade and greatly favoured by the Byzantine Emperor, Alexius. He founded a Christian principality in the Lebanon, which was later known as the county of Tripoli.

Raymond, Henry Jarvis (1820-69), Amer. journalist and politician; b. Lima, Livingston co., New York, son of a small farmer. He graduated at the univ. of Vermont in 1840. Assistant ed. of *Tribune* when it was estab., April 1841, he founded the *New York Times* in 1851. He served in the State Assembly and was lieutenant-governor, 1854. Active in the formation of the Republican party, he was Speaker of the State Assembly, 1861, and congressman, 1864. R. left the Republicans in 1866 and supported National Union.

Raymond, Walter (1852-1931), novelist and nature writer, b. Yeovil, Somerset. He entered his father's wool business but at the age of 40 abandoned it for literature. His first novel, *Misterton's Mistake*, had already appeared in 1888. It was followed by *Gentleman Upcott's Daughter*, 1892, which shows his admiration for the work of Barnes, the Dorset poet. After a short time in London he rented a cottage at Withypool, on Exmoor, at a shilling a week; his life there is described in his *Book of Simple Delights*, 1906, which shows his powers as a rural essayist and portraitist. Others of his works are *The Book of Crafts and Characters*, 1907, and *English Country Life*, 1910.

Raymond Lully, see LULLY, RAMÓN.

Raymund of Fitero, Saint (d. 1163), b. in Aragon. A Cistercian, he founded Fitero Abbey in Sp. Navarre. When the city of Calatrava was in danger from the Moors he founded the military order of Calatrava for its defence. Under his leadership the order acquired great fame in Spain.

Raymund of Peñafort, Saint (1175-1275), b. Vilafranca. After being a priest at Barcelona he joined the Dominican order in 1222. Gregory IX, whose confessor he became, charged him with the codification of the canon law, and his 5 books of decretals, completed in 1234, remained the standard authority until 1917. He became master-general of his order in 1238.

Raynaud's Disease (A. G. M. Raynaud, Fr. physician, 1834-81), condition of intermittent vasospasm of the blood vessels of the hands and fingers. Less commonly the feet and toes are affected, and sometimes the nose and ears. The parts become blanched and numb in the cold. In more severe cases, the fingers become swollen and plum coloured from the disordered circulation. In extreme cases ulceration and even gangrene may occur. The condition, which is bilateral and more common in females than males, is probably due to an overaction of the sympathetic nervous system. In bad cases it may be necessary to cut by surgical operation the sympathetic nerve supply to the affected part. The operation is known as 'sympathectomy'.

Raynaud, François Juste Marie (1761-1836). Fr. savant and philologist, b. Brignoles, Var. He wrote his tragedy *Caton d'Utique*, 1794, in prison, to which he had been confined on account of his Girondist sympathies. Having amassed a competence in the legal profession at Draguignan, he embarked on a literary career in Paris. After enjoying a single dramatic success with *Les Templiers*, 1805, he produced 3 works of conspicuous learning, *Choix de poésies originales des troubadours* (6 vols.), 1816-21, a *Lexique roman*, 1838-44, both philological studies, and an *Histoire du droit municipal en France*, 1829.

Rayon, or Artificial Silk, as it was originally called, is prepared by various processes of treating cellulose in solution so as to draw it out into fine threads. Cellulose, which is the basis of all vegetable structure, is for purposes of R. obtained usually from cotton or from the wood pulp of spruce-trees. As far back as 1754, Réaumur, the Fr. physicist, guessed at the possibility of imitating the product of the silkworm, but it was not until the discovery of nitro-cellulose that R. could be produced on an industrial scale. In 1855 Audemars of Lausanne obtained from a solution of nitro-cellulose a thread which he called artificial silk and used as a filament for electric globes. From this experiment was derived the nitro-cellulose process, developed by Count Hilaire de Chardonnet in 1866, the first of many different methods by which R. is prepared in industry to-day.

Cuprammonium Rayon. Originally called Despeissis Silk after M. Despeissis, who invented the cuprammonium process. It is made by dissolving pure cotton cellulose in ammoniacal copper oxide. The dissolved cotton is then filtered and passed through to the spinnerets or capillary tubes. The resulting threads are coagulated either in acids or alkalis.

Viscose Rayon. The cellulose is obtained mostly from wood pulp and treated with caustic soda to form an alkali-cellulose. This is then united with carbon bisulphide to form a xanthate, termed viscose by its inventors, Messrs Cross and Bevan (1892). After careful filtration the xanthate is conveyed to the thread-forming machines and coagulated by heat.

Acetate Rayon, is obtained from cotton or wood pulp treated with acetic anhydride. The cellulose acetic, thus formed, is dried and then dissolved in acetone; after filtration, the mixture is ready to be made into paints and varnishes or into rayon threads. See American Viscose Corporation, *Rayon Technology*, 1953, and R. W. Moncrieff, *Artificial Fibres*, 1953.

Razakars, see HYDERABAD.

Razin, Stepan (dinin. Stenka) Timofeyevich (d. 1671), leader of a peasant rebellion in Russia in 1670, a Don Cossack (see COSSACKS). He seized large towns on the S.E. of European Russia and all the towns on the Volga from Astrakhan to Samara. He was finally defeated and broken on the wheel in Moscow. R. is a popular hero in Russian folklore.

Razor (O.F. *rasor*; Lat. *rasare*, to scrape), cutting instrument, used chiefly for shaving the beard. The manuf. of R.s demands a high quality of cast steel and workmanship for forging and grinding. Good quality R.s are produced in Germany and the U.S.A., but the processes are similar to those followed in the cutlery trade of Sheffield, Yorks. To-day almost all R.s are forged under a drop hammer between suitable dies, though formerly hand forging was practised. The steel was first supplied in bars whose thickness was represented by the maximum thickness of the completed R. The forger fashioned a portion of the bar into the rough form of a R.; the blade was then more completely shaped on the anvil, the required amount of concavity effected, a good edge put on, and the tang drawn out. The blade was next dry-ground; this removed all trace of oxide and hollowed out the metal still more completely to a fine edge. The process of hardening was then carried out by heating the metal to a bright red and plunging it into cold water. This made the steel very brittle, rendering tempering by less extreme heating and cooling necessary. Wet-grinding on stones varying in diameter from 2 in. to a foot then served to bring the edge to a fine, almost uniform sheet. The processes of polishing R.s involve applying the blade to a wheel covered with a tin-lead alloy and supplied with emery-powder paste. When the requisite degree of polish has been attained the blade is jointed into a haft made of bone, ivory, horn, or celluloid. Hollow-ground R.s may be whetted time after time for years without the necessity for regrounding, and have altogether superseded the flat ground form. Safety R.s of various types have become popular; their essential feature is the provision of a guard which smooths out the skin as the blade

comes in contact, thus reducing the risk of cutting. The blades of most safety R.s are not meant to last, and may be purchased for a few pence. Recently, however, safety R.s have been made to enable certain blades to be stropped or resharpened.

Razor-backs, see FIN-WHALES.

Razor-shell (*Solen*), genus of widely distributed lamellibranch molluscs with very elongated shells, the valves of which are open at both ends, and are almost straight. The foot is highly developed; it can be pointed or contracted for boring with great rapidity into sand, and with it the R. can retain so tight a hold that the foot often has to be torn off before the creature can be removed. *S. siliqua* and *S. ensis* are Brit. Both are edible, and though now not much eaten, were considered a delicacy by the ancients.

Razorbill, or Black-billed Auk (*Alca torda*), only remaining species of a genus which included the now extinct great auk (*A. impennis*). It breeds on the sea rocks on various parts of the coasts of S. Greenland, Iceland, Scandinavia, the Brit. Isles, and in the Bay of Fundy and the Gulf of St Lawrence, making no nest, and laying only 1 egg, which is white with brown markings. The R. is about 18 in. long; the head, neck, and upper surface are glossy black, and the breast and under parts pure white. The black beak is large and much compressed, and the end is curved. The bird is a capable swimmer and diver.

Razure, see FRASURE.

Ré, or Rhé, Ile de, is. with an area of 28 sq. m. off the shores of the dept of Charante-Maritime, France, 6 m. W. of La Rochelle. It has vineyards, orchards, salt deposits, cornfields, and oyster fisheries (this is the prin. industry). St Martin is the cap. Pop. 10,000.

Reactance of an electric circuit on alternating current (q.v.) is the component of impedance (q.v.) arising from electrostatic and electromagnetic inertia, dependent on capacitance, C , inductance, L , and frequency, f . The voltage needed to maintain a current $I \sin 2\pi ft$ in an inductance L is $e = L \frac{di}{dt} = 2\pi fLI \cos 2\pi ft$, leading the current by 90° . The inductive R., or ratio of maximum voltage to maximum current, is $2\pi fL$. The same current maintains a voltage on the capacitor C given by $e = \frac{1}{C} \int I \sin 2\pi ftdt =$

$\frac{I}{2\pi fC} \cos 2\pi ft$ lagging by 90° . The capacitive R. is $-1/2\pi fC$. The total R. if both L and C are present is $X = 2\pi fL - \frac{1}{2\pi fC}$. At very low frequencies an inductance acts almost as a short-circuit, a capacitor almost as an open-circuit. At high frequencies a capacitor is almost a short circuit, an inductance an open-circuit.

Reactor, Current-limiting, a coil of a few turns used between sections of busbars (q.v.) or as earthing connection

for machines, transformers, or networks, preventing a sudden steep rise of current on short-circuit or fault conditions.

Read, Sir Herbert Edward (1893-), poet and critic, b. Kirbymoorside, Yorks. His course at Leeds Univ. was cut short by the First World War, in which he won the D.S.O. and M.C. After 2 years in the Treasury Department he became assistant keeper in the Victoria and Albert Museum from 1922 to 1931, and was then prof. of fine art at Edinburgh till 1933; thereafter till 1939 he ed. the *Burlington Magazine*. A careful and conscientious craftsman of free verse, he pub. a succession of vols. from 1919 onwards, his *Collected Poems* appearing in 1946. As a critic he belonged to the school of Coleridge, his works including *Reason and Romanticism*, 1926, *English Prose Style*, 1928, *The Sense of Glory*, 1929, *Wordsworth*, 1930, *Form in Modern Poetry*, 1932, *In Defence of Shelley*, 1935, *Essays in Literary Criticism*, 1938, *The True Voice of Feeling*, 1953, and a number of books on art. *The Innocent Eye*, 1933, and *Annals of Innocence and Experience*, 1940, are autobiographical. He was knighted in 1953. See studies by H. W. Hausermann, 1938, and H. Treece, 1944.

Read, Ople Percival (1852-1939), Amer. humorous writer, b. Nashville, Tennessee. His humorous novels embodied a whimsical philosophy and enjoyed great popularity. They include *A Kentucky Colonel*, 1889, *A Tennessee Judge*, 1893, *On the Suwanee River*, 1900, and *An American in New York*, 1905. *I Remember*, 1930, is an autobiography.

Reade, Charles (1814-84), novelist and dramatist, b. Ipsden, Oxon. He was in 1835 elected a fellow of Magdalen College, Oxford, but lived mostly in London, and moved in Bohemian circles, to the great scandal of his academic confrères. In 1851, when he was serving as vice-president of Magdalen, he began his literary career with a tragedy, *Angelo*, which was produced at the Olympic in 1851. In the following year he wrote in collaboration with Tom Taylor the popular comedy *Masks and Faces*, which he turned into the novel, *Peg Woffington*, 1853; but the play, though it has effective scenes, is tawdry. R.'s next novel, *Christie Johnstone*, 1853, is one of his best. Then followed *It is Never Too Late to Mend*, 1856, an exposure of the prison system, and many other novels and plays which do not call for detailed mention. R. stands or falls by *The Cloister and the Hearth*, 1861, and there can be little doubt that he will stand by this for many generations to come. It is one of the greatest of historical novels, surveying the customs of Holland and Germany, of France and Italy, in the 15th cent., just before the Renaissance. It is a dashing tale of adventure, of fights with leopards, bloodhounds, bears, robbers; but its chief merit is the love story, so sad and exquisite. *Hard Cash*, 1865, is an exposure of the private asylum. See lives by R. F. Littledale, 1884; W. C. Phillips, 1919; and M. Elwin, 1931, 1948.

Reading, Sir Rufus Daniel Isaacs, first Marquess of (1860-1935), of Jewish descent, judge and administrator, second son of Joseph Michael Isaacs, of London, fruit merchant. Educ. at Univ. College School (London), Brussels, and Hanover, he went as a boy on a coal-ship running to Rio de Janeiro, for 2 years; later he was his father's agent at Magdeburg, went on the Stock Exchange, and finally studied law, being called to the Bar in Middle Temple, 1887. His knowledge of the city brought him forward almost immediately in company actions, and within a few years he had one of the largest practices at the Bar; he took silk in 1893. Liberal M.P. for Reading, 1904-13, he became solicitor-general and was knighted on the elevation of Sir Samuel Evans to the bench, Mar. 1910, becoming attorney-general the following Oct., in succession to Sir W. S. Robson (made lord of appeal). In 1912, somewhat in defiance of usage, he was admitted to the Cabinet while still holding the post of attorney-general. On 20 Oct. 1913 he became lord chief justice of England. He was made Baron R. of Eleigh on 9 Jan. 1914, and Viscount R., 26 June 1916. He was president of the Anglo-Fr. Loan Commission to the U.S.A., 1915. The outstanding incident of his chief justiceship was his presiding over the trial of Roger Casement for treason, 26-30 June 1916. R. was special envoy to the U.S.A., 1917, and was made Earl of R., 20 Dec. 1917. Special ambas. to the U.S.A., 1918-19, in 1921 he vacated the chief justiceship, and became viceroy of India. His period of office coincided with the rise of Gandhi (q.v.), with whom he had sev. interviews. His telegram of 7 Mar. 1922, to the secretary of state gave, when pub. (see MONTAGU, R. S.), the finishing stroke to the pro-Greek policy of the treaty of Sevros. He was obliged in 1924 to use his special powers to carry the budget without consent of the assembly. He visited England in 1925 to confer with the home gov. as to reforms in India; and he brought about the abdication of the Maharaja of Indore, suspected of complicity in a murder. He strengthened Britain's moral claims to Indian support by combining a policy of benevolent patience with even-handed justice. His term expired early in 1926, and on 7 May he was made marquess. As a member of the Indian Round Table Conference, he put forward the outline of a scheme of All-Indian Federation, with responsibility at the centre, and due transitional safeguards (1931). In that year he was appointed foreign secretary in the National Gov. (q.v.), but relinquished the post in favour of Sir John Simon following the general election of that year. He was the first of Jewish race to fill the offices of lord chief justice of England, viceroy of India, and foreign secretary, and his career, full of romance, is unparalleled in our later legal and political annals. See life by his son, 1943-5.

Reading: 1. Cap. of Berkshire, England, 36 m. by rail W. of London, on the

Kennet, at its confluence with the Thames. Here is the huge biscuit factory of Messrs. Huntley & Palmer. Palmer Park, second only to Prospect Park (120 ac.), was the gift of George Palmer; here also are Sutton's seed-testing grounds. There are also iron foundries, boat-building yards, and engineering works, R. being an important junction on the W. Region railway. R. Univ. (q.v.) is the centre of instruction in dairying for the Brit. Isles. The grammar school (founded by Henry VII in 1486) now ranks with the lesser public schools; among its pupils was Archbishop Laud, a native and benefactor of the tn. As many as 9 Parliaments were at different times (1432, 1451, etc.) held in the wealthy Benedictine abbey (founded in 1121), whose consecration in 1164 was solemnised by Becket in the presence of Henry II. A Dan. encampment in 871, R., or rather 'Rad-ynges,' is credited with 30 houses at the time of the Domesday survey, whilst in the 16th cent. a writer explains that the tn 'chiefly stonidith by clothing.' It sends 2 members to Parliament. Pop. 117,700.

2. Cap. of Berks co., Pennsylvania, U.S.A., on the Schuylkill R., 45 m. NW. of Philadelphia by rail. In a coal- and iron-mining dist., it has steel and railway repair works, iron foundries, and rolling mills, and many manufs. Albright College is here. Pop. 109,320.

Reading, Univ. of, founded 1926. A univ. extension centre was opened at Reading in 1892 through the encouragement of leading authorities at Oxford Univ., and in 1902 it became recognised as a Univ. College, the univ. being estab. by royal charter in 1926. The National Institute for Research in Dairying is estab. here. It is hoped ultimately to transfer the univ. to Whiteknights Park, 1 m. from the tn centre, where building has already commenced. There are nearly 1200 students.

Real, term used by lawyers with the primary significance of things permanent or immovable, as lands or tenements (see **REAL PROPERTY**, **PERSONALTY**, and **PROPERTY**). A R. right, or *jus in re* in Scots law, is a right of property in a thing in virtue of which the person vested with the right may sue for possession of the thing into whosoever hands it may go. A R. composition is an agreement between the owner of lands and the parson or vicar, with the consent of the ordinary, that such lands shall be discharged from payment of tithes in consequence of other land being given to the parson in satisfaction thereof. In Scots law a R. burden as opposed to a personal burden denotes an imposition of money on the subject of a right in the deed by which the right is constituted, a personal burden being merely imposed on the receiver of the right. Bentham also used the term in connection with evidence, meaning by R. evidence that which is afforded in any particular case by material objects, as for example, by weapons, a jemmy, etc.

Real, Sp. silver coin worth a quarter of the 'peseta' which is still current in Mexico and other old Sp. possessions. The Portuguese it. is valued at 40 reis. The famous dollar 'piece of eight' contains 8 Rs.

Real Presence, in Christian theology, the substantial presence of the body, blood, soul, and divinity of Jesus Christ under the species of the eucharistic bread and wine after consecration. The doctrine of the R. P. is held by the Rom. Catholic and Orthodox Churches, and also by some Anglican theologians. According to the Rom. Catholic Church, the R. P. is effected by transubstantiation (q.v.), i.e. the 'substance' of the bread and wine is changed, while the 'accidents' (appearance, weight, etc.) remain the same. This, the scholastic explanation, is not admitted by the Orthodox and Anglican Churches; but traditional Orthodox theologians use the Gk equivalent of the word (*μετουσίωσις*), and their teaching on the R. P. is accepted by the Rom. Catholic Church. Anglican believers in the R. P. usually adopt the explanation known as consubstantiation (q.v.).

Real Property. Div. of property into real and personal is the cardinal div. in Eng. law (see **PERSONAL PROPERTY**). The old term for R. P. was 'lands, tenements, and hereditaments,' the later term 'real' being derived from the old remedy for dispossession (see **PERSONALTY**; **RECOVERY**). R. P. comprises: (1) immovables (excluding leaseholds, which are personal property), which are further subdivided into (a) corporeal, e.g. lands, houses, hereditaments (see also **HEREDITAMENTS**), and (b) incorporeal, e.g. tithes, rents, advowsons, reversions; (2) incorporeal hereditaments, e.g. watercourses, rights of common (see **INCORPOREAL CHATTELS** and **HEREDITAMENTS**); (3) personal property 'notionally' converted in equity into R. P. (see also **CONVERSION**); in other words, money or money's worth ordered by a testator or other person disposing of property to be laid out in the purchase of land; and (4) certain shares in joint-stock companies, e.g. in the former New River and the Axon Navigation Companies, though these shares have now been converted into port stock. R. P. chiefly differs from personal property in: (1) its susceptibility from feudal times of being limited or marked out into estates (see **ESTATE**; **LIMITATION OF ESTATES**). In personalty some may have the income for life and others the corpus in absolute ownership, but there are no estates. (2) R. P. on intestacy, prior to the Administration of Estates Act of 1925, devolved on the heir, personally on the next-of-kin (see further **HEIR**; **SUCCESSION**; **INTESTATE**). (3) The beneficiary, under a will, of R. P. is called the devisee, of personalty, the legatee; but since the Land Transfer Act, 1897, under which all property vests in the first instance, this distinction is of less importance. (4) Personal property is liable as assets in priority to R. P. for the liquidation of the

deceased's debts, in the absence of provision by the testator to the contrary. (5) R. P. is said to be conveyed (*see* CONVEYANCING); personality only is said to be assignable (*see* *also* PROPERTY; LAND LAWS; and LAND).

Realgar, or **Ruby Sulphur**, sulphide of arsenic; formula As_2S_2 . It is found native as orange-red monoclinic crystals, of hardness 1½–2 and sp. gr. 3.5; it is also found as an incrustation in the neighbourhood of volcanic exhalations. The artificial disulphide (As_2S_2) is obtained by fusing together arsenic and sulphur. It is readily fusible, and can be made to sublime easily. R. is used in pyrotechny, and was used as a pigment until superseded by lead chromate. The name is of Arabic origin.

Realism (philosophy), an interpretation of life as opposed to idealism (q.v.). It involves the beliefs that time, space, and their attributes are real (transcendental R.), that phenomena exist apart from our consciousness or conception (empirical R.), and that our perception of them is governed by direct intuitive cognition, not by the mediate process of representative ideas. It has figured in philosophy from the beginning: e.g. Socrates, Plato, Aristotle. During the Middle Ages the term R. was used in scholastic philosophy to denote the teaching of the 'reality' of universal ideas; R. was thus contrasted with nominalism (q.v.). St Thomas Aquinas and Duns Scotus (qq.v.) were moderate realists. Modern R. has important teachers in Sir W. Hamilton (natural and hypothetical R. or dualism), Herbert Spencer (transfigured R.), G. H. Lewis (reasoned R.), and others, and is chiefly a reaction against idealism. The term R. as used to signify certain types of art and literature is also the result of anti-idealistic reaction; its disciples claim to present life as it really is, both its joy and sorrow, its beauty and ugliness, the imperfections being generally emphasised, e.g. Zola, Dostoyevsky, Thomas Hardy (qq.v.).

Reality. Consideration of R. is the primary difficulty in all philosophical discussion, since it involves the question of the existence and the nature of matter. Many philosophers have urged that matter does not actually exist apart from essential idea, i.e. that R. is relative, not absolute. What is commonly understood by R., they say, is nothing more than appearance. R. itself in its ultimate truth being the unknown object of all metaphysical inquiry. It is conceivable that between appearance and R. there is a qualitative change, e.g. science reduces matter to electric energy: Berkeley and other idealists regard it as an idea or group of ideas existing in the mind of God, and so on. On the other hand, realists and materialists assert that thought, mind, or consciousness apprehends but does not create matter. The term 'real,' therefore, implies the state of being or existence; thus any notion or concept has necessarily the quality of R. Yet R. is opposed to concepts which are neither true nor false

and which fallaciously involve the element of existence. The term 'unreal' is, therefore, one of purely psychological relativity, expressing illusions and hallucinations as distinct from phenomena (*see* PHENOMENON) or sense-impressions. On broader grounds it is clear that when the term 'unreal' is employed it denotes not a negation but a difference in order and degree of R. In logic R. is used as distinct from, and intermediate to, the extremes of: (a) possibility, i.e. the fact that with certain conditions a thing may be affirmed as existing; and (b) necessity, i.e. the fact that with certain conditions a thing must be affirmed as existing. *See also* METAPHYSICS; ONTOLOGY.

Ream, *see* METROLOGY; **PAPER**.

Reaping. In the beginning of the 19th cent. cereal crops were harvested, as in prehistoric times, by means of the R. hook or sickle. This tool is still indispensable in dealing with badly lodged crops, but its use is very slow, ¼ ac. being the utmost a man can cut in a long day. The scythe had long been used in cutting hay, but was not satisfactory for corn until a cradle of iron or wood, to lay the stalks in a swathe, was provided. It is still sometimes used to cut a roadway round each field for the machine to start. A R. machine was first introduced by the Rev. Patrick Bell in 1826. It only cut the corn and laid it in a swathe at the side. This was followed by manual delivery reapers, which required a man to remove the sheaf from the machine, and self-delivery reapers, which, by means of revolving sails, discharged the sheaf to the ground. The sheaves were then generally tied with bands of corn by gangs of men stationed round the field. About 1885 the binder, which gathers the sheaf, ties it with string, and throws it off the machine, was introduced. This is a very complicated machine, and its employment, resulting in the cheapening of corn, has been of great importance to the human race. The binder, which may be tractor or horse drawn, can, depending on size, cut 6 or 8 ft at a time and cover as much as 20 ac. in a day. When working, the sails of the binder gather the cut corn on to an endless canvas belt which feeds it to an incline, where it is pushed or accumulated, until a sheaf large enough to depress a lever causes a curved arm, threaded with string, to rise and encircle the bundle with a cord, which is then knotted and cut, when a pair of arms discharge it. The sheaves must then be traved (stooked or shocked) to protect them from the weather and from premature germination which might occur on the ground. In some cases the corn, particularly oats and wheat, is cut early to prevent 'shelling,' and final ripening takes place in the trave. The corn is then carted and stacked, and the stack thatched, to await thrashing (q.v.).

This process is eliminated by the combine harvester, which cuts and thrashes in one operation. The combine can be one of 3 types: (1) tractor drawn and powered; (2) tractor drawn and self-

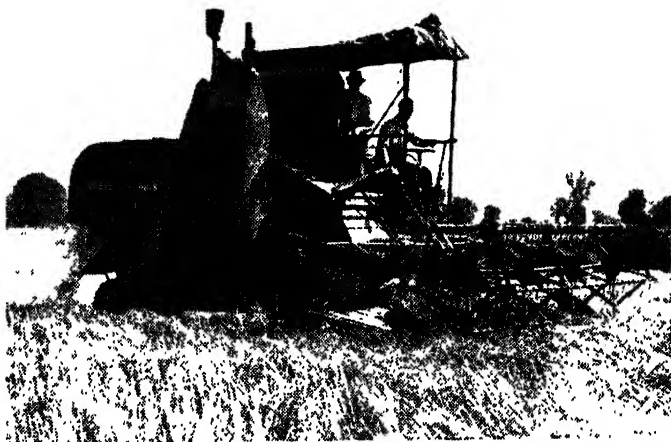
powered; (3) self-propelled, of which the last is the most important and generally used, having its cutter bar, which is similar to that of a binder, in front, enabling a direct approach to the work. The thrashing mechanism is like that of a stationary thrasher. All grain must be dead ripe before being 'combined' to limit, as far as possible, the necessity of drying before storage.

Rear-Admiral, see ADMIRAL.

Reason, term used in logic and philosophy with many different meanings. In ordinary usage it may be taken as equivalent to common sense and opposed to

to SE. towards Loch Shin. It is a vast deer preserve belonging to the Duke of Westminster, and its highest point is Ben Hec (2864 ft.). A considerable re-afforestation scheme has been carried out.

Rebate, allowance or reduction of price made for prompt payment, etc. R.s of customs duties are granted on damaged goods. Gas and water companies often give a rebate on pre-payment meters: this is the return of excessive charge made to cover rises in cost, the rent of apparatus at low consumption levels, etc. Deferred R. is a commercial practice among large trusts and their agents or distributors: R.



John Turlton

THE COMBINE HARVESTER

The man seen standing is tying off filled bags of threshed grain.

prejudice. See LOGIC; RATIONALISM; PHILOSOPHY; PSYCHOLOGY; KANT, etc.

Reate, see RIETI.

Réaumur, René Antoine Ferchault de (1683-1757), Fr. scientist, b. La Rochelle, nicknamed the 'Pliny of the 18th cent.' An able and observant natural historian, he left behind him an exhaustive hist. of insects (1734-42). Besides discovering the white opaque glass and the famous thermometer which bears his name, he wrote monographs on subjects so different as turquoise mines and the silk of spiders, auriferous riva, and the manuf. of tin. For his thermometer R. used a mixture of alcohol and water, and called the freezing point 0° and the boiling point 80°.

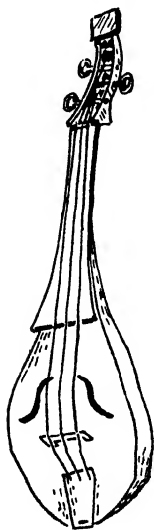
Réaumur Thermometer, see THERMOMETER and THERMOMETRY; METROLOGY.

Reay Forest, area of W. central Sutherland, Scotland, lying N. of the chain of small lochs which cross the co. from NW.

which does not appear on the invoice, but is deferred in some cases for 6, in other cases for 12, months, provided certain conditions are fulfilled. Amongst these conditions, it may be stipulated that the trader shall enjoy such R. provided he: (1) does not retail below a certain agreed figure the goods of the corporation granting the R.; (2) agrees not to sell or display similar wares of a rival organisation. Should such conditions be broken, the contract becomes void, and the retailer may forfeit his claim to the deferred R., which in many cases represents a considerable percentage on the original invoice figure. By the advocates of the system it is maintained that the process keeps the trader on good terms with the larger corporations, on account of the reward which is offered after certain periods of 'good behaviour,' and helps in the suppression of rival concerns. On the other hand, the R. may have the effect

of suppressing competition, and in this form has attracted attention in American discussions of anti-monopoly legislation. The system was used by some of the larger shipping combines, particularly in respect of freight traffic, where, it was argued, for reasons of economy it was eminently desirable to maintain a regular flow of freightage on those lines of tramp steamers where short cargoes often spell loss. R. is also used in carpentry to mean a stop cut along an edge.

Rebec, or Rebeck (Arabic *rabab*), musical instrument of Arab origin, popular in the Middle Ages, the immediate forerunner of the viol family and the ancestor of the violin family, though its shape was more like that of the mandolin, which is probably one of its descendants. It was introduced into Europe from the E., and was either pear-shaped (tapering to the neck) with strings, or boat-shaped with 2 strings, and was played with a bow. It survived in France until the 18th cent., but only as a street instrument.



Rebekah (Rebecca), wife of Isaac, and mother of Esau and Jacob (Gen. xxiv and xxvii).

Rebikov, Vladimir Ivanovich (1866-1930), Russian composer, b. Krasnoyarsk, Siberia. He was the most advanced, if by no means the strongest or most important, Russian composer of his generation, using many unconventional devices and evolving an idiom of his own, which,

however, was not sufficiently vital to sustain large-sized works. His short piano pieces are his most characteristic work. He also wrote operas and ballets.

Rebus, a riddle or puzzle which is set out *non verbis sed rebus*, not with words but with things, i.e. with pictures representing words or syllables, for example, a cat sitting on a log might represent catalogue. Such enigmatic representation was sometimes used in satirical productions in order to avoid libel actions. In heraldry the term is applied to punning devices on a coat of arms, such as the broken spear on the shield of Nicholas Breakspear (Pope Adrian IV) (q.v.).

Récamier, Jeanne Françoise Julie Adélaïde Bernard, Madame (1777-1849), Fr. society leader, b. Lyons, perhaps the finest representative of those women who swayed the *salon*; she thus became an unacknowledged legislator. In her teens she was married to M. Jacques R., a rich banker and about thrice her age. A record of the splendid social triumphs of Mme R. would involve notice of nearly all that was distinguished in Paris during a space of about 50 years. To the famous Madame de Staël she was bound by ties of extreme affection and intimacy, and the most distinguished *ami* of her later years was M. de Chateaubriand. She died of cholera, a disease of which her dread had always been great. Her *Souvenirs et correspondance*, ed. by her niece Mme Lenormand, were pub. in 1857. See N. Williams, *Madame Récamier and her Friends*, 1901; E. Herriot, *Mme Récamier et ses amis*, 1904, 1934; Margaret Trouncer, *Madame Récamier*, 1949.

Recanati, It. tn, in the Marches (q.v.), 8 m. NNE. of Macerata (q.v.). It has a 14th-cent. Gothic cathedral. Leopardi (q.v.) was b. here. Pop. (tn) 6800; (com.) 17,400.

Recapitulation (biology), see BIOLOGY; HAECKEL, ERNEST.

Reccared (d. 601) Visigothic king of Spain, son of Leovigild, whom he succeeded in 586. During his reign Arianism was definitely abandoned in Spain, and Catholicism adopted, though at the cost of abandoning the Gothic language previously used in the Arian liturgy.

Receipt, written discharge of a debtor on payment of money due, or an acknowledgment in writing of having received a sum of money or other valuable consideration (q.v.). A R. for part of a sum of money due will not operate to discharge the debtor of the residue, even though it be expressed to be in full satisfaction, unless there be some consideration given to the creditor for so forgoing the rest of his legal demand. A R. is evidence of payment of a debt, but may be upset by counter-evidence to the effect that it was given under a misapprehension or obtained by violence, duress, or fraud. A R. for £2 and upwards must bear a 2d. stamp, which may be either adhesive or impressed. If unstamped it will be admissible in evidence only on payment of a penalty of £10. Again any person who gives a R. and refuses to

stamp it or divides it with intent to evade the duty is liable to a similar penalty.

Receiver, an accountant appointed in certain cases by the bankruptcy court upon the application of creditors, or other interested parties, to receive income and pay debts. The court can appoint a R. whenever it appears to be just or convenient to do so. R.s. are usually applied for in debenture-holders', mortgagees', and partnership actions. When appointed the R. acts for the benefit of all the creditors, and not merely the creditor or creditors who applied for the appointment to be made. A R. may be appointed as R. and manager to carry on a business, but unless expressly appointed manager he has no powers of management. The court gives managerial powers over and above those of a mere R., only with a view to sale or realisation of the assets, for the simple reason that the court (a R. being deemed an officer of the court from the date of his appointment) will not undertake the permanent management of any business. The main duties of a R. are to collect and receive rents, profits, or income, get in outstanding assets, pay and discharge ascertained debts or liabilities, and take proper receipts for such payments. Interference by third parties with the possession of a R. may be restrained by injunction, and may also render such parties liable to committal for contempt. The Dept of the Official R.s. in Bankruptcy (High Court, Bankruptcy Buildings, Carey St., W.C.) consists under the Bankruptcy Acts of 1914 and 1926 of a senior official R. and official R. and assistants. Official R.s. are also appointed for co. court dists. A list will be found in the current law list. Under the Companies Act (1948) there exists a Dept of Official R.s. Companies (Winding-up), High Court.

Receivers, Radio. The simplest receiver consists of a tuned oscillatory circuit (q.v.), a signal rectifier, and a pair of headphones. The non-linear electrical characteristic of the rectifier serves to demodulate the carrier wave, passing the audio-component to the headphones. The advent of the valve (q.v.) made it possible to increase sensitivity by means of amplifying stages. These 'straight' receivers consist of a radio-frequency amplifier, a signal detector, and an audio-frequency amplifier. Such receivers, while possessing a high degree of sensitivity, are unselective. Modern receivers are of the superheterodyne type (superhets). A frequency changer is employed in which the wanted signal is mixed with a locally produced signal to give: (1) a signal of frequency equal to the *sum* of the frequencies of the wanted station and the local oscillation, and (2) a signal being the *difference* between them. One of these products is fed to a fixed tuned amplifier, the intermediate-frequency or I.F. amplifier. All incoming signals are converted to the I.F. by keeping the local oscillator in step, but separated from the signal frequency by an amount equal to the I.F. The advantage is that the I.F.

can be pretuned and made both sensitive and selective. In this way the receiver is easily controlled and is more efficient than its tuned radio-frequency counterpart. A broadcast receiver must not be too selective, or the quality of the received music or speech will suffer, but there is another class of receiver for communications work where output quality is of secondary importance compared with its ability to discriminate against unwanted signals and noise. It must have a sensitivity of a few micro-volts and be able to reduce interference from a station separated by only a few cycles from the wanted one; it must be able to receive both telephony and telegraphy signals and feed its output either to a loud-speaker or headphones. Such a receiver will generally have 1 or 2 tuned radio-frequency amplifiers before the frequency changer stage, then 1 or more stages of I.F. amplification, a detector diode and another diode for developing automatic volume control (A.V.C.) voltage and, finally, 1 or 2 audio-frequency stages. The normal upper frequency limit of such receivers is around 30 Mc/s, and above this special variations of the normal superhet technique are encountered. The process of frequency changing is often carried out twice with 2 separate I.F. amplifiers of different frequencies to give adequate gain and selectivity. Crystal mixer stages, grounded-grid triode radio-frequency stages, and special valves have all made their appearance recently, and superhet development for very high frequency (V.H.F.) use is advancing rapidly. See **RADIOCOMMUNICATION**.

Receiving Order, order by a court for the protection of the estate of debtor who has committed an act of bankruptcy. It may be made either on the petition of a creditor or creditors to the amount of £50 and presented within 3 months of the act of bankruptcy, or on the petition of the debtor himself, alleging that he is unable to pay his debts.

Receiving Stolen Goods. A receiver of stolen goods is triable either as an accessory after the fact or as a prin. offender. It is essential to prove that the goods were stolen; but if the only witness to such original stealing be the thief himself, the judge ought to direct an acquittal of the alleged receiver. It must also be established that the goods were received by the accused into his actual possession, a joint possession with the thief being insufficient; the mere fact that stolen goods are found in the accused's possession is good presumptive evidence of his having received them. Lastly, guilty knowledge must be proved; this may be effected either directly by the evidence of the thief or circumstantially by showing, for example, that the receiver bought at a gross undervalue, denied that he had the goods in his possession, or (perhaps) that he was in possession quite recently after the theft. The punishment for R. S. G. may extend to imprisonment for 14 years, but if the theft were a misdemeanour (as, for

example, if the thief obtained them by false pretences) the maximum sentence is 7 years.

Rechabites, anct Jewish religious order, founded by Jehonadab, the son of Rechab. The object of the founder was the perpetuation among his own posterity of his nomadic style of life, and with this view he prescribed various rules, the prin. of which were to refrain from building houses and to eschew wine. (2 Kings xv. 10; Jer. xxxv.)

Rechabites, Independent Order of, registered Friendly Society for total abstainers, estab. at Salford, Lancs, 25 Aug. 1835. It provides sickness, death, endowment, and other benefits and facilities to members, and promotes temperance teaching and propaganda; it has an active juvenile section. Branches, called 'tents' and grouped into dists., cover the whole Brit. Isles and dominions.

Recife, or Pernambuco, cap. of Pernambuco state, and seaport of N. Brazil, on the E. extremity of S. America. An opening in one of the reefs (Portuguese *recife*) permitting access to the calm lagoon behind it provides a natural harbour for the port of R. Sugar and cotton thrive in the area because of the hot and humid climate. The city exports sugar, rum, hides, cotton, fruit, and dyewoods. It comprises 3 quarters. Of these the oldest and most densely populated is São José do R. The more spacious Santo Antônio, on the is. of Antônio Vaz, sprang up during the Dutch occupation (1630-54); it is a flourishing commercial port with customs house, exchange, warehouses, etc. Boa Vista is modern and mainly residential.

R. is one of the earliest Portuguese settlements in Brazil, a successful colony being founded at Olinda, near the site of R., in 1537. R. itself was not founded until 1561, and, together with São Paulo and Bala, was one of the chief primary settlement centres from which the Portuguese carried forward their conquest of Brazil. In 1624 the Dutch succeeded in occupying R., and in extending their control of the coast from the N. border of Bala to the Amazon. The Portuguese colonists, however, returned to the attack, and, without help from Portugal, pushed the Dutch invaders back step by step until, in 1654, they retook the city of R. Sugar cultivation was early introduced by the Portuguese in the coastal region around R., and forest-clearing and cane-planting spread rapidly inland from R. in the state of Pernambuco. After 1574 Negro slaves were imported in large numbers in R. R. has a cathedral, a univ., and a naval station. Pop. 512,000.

Reciprocal. If a quantity be represented by a/b , its R. is b/a . See Barlow's *Tables of Squares, Cubes, Square Roots, Cube Roots, Reciprocals*.

Reciprocating Motion, oscillation in a straight line of a portion of machinery, e.g. the piston in the cylinder of an engine; the reciprocating parts affect the balance of the engine, and the vibration and shock due to their motion have to be minimised. See STEAM ENGINE.

Reciprocity. Shortly expressed, the theory of R. of exchange in international trade means that a given country should decline to receive imports from another country except on condition that the latter accepts the commodities of the former in return. A modified form of R., adapted to the conditions of international trade, exists, and has existed for a century, in the shape of commercial treaties (q.v.). Such treaties cannot in the nature of things be consistent with Free Trade principles, because their very existence presupposes the existence of a tariff in both the contracting nations. England, for example, at the time of Cobden's treaty with France in 1860, was not a free-trade country; for in consideration of France substituting for its prohibitive (see PROTECTION) duties moderate protective duties not exceeding a maximum *ad valorem* charge of 30 per cent, England agreed to abolish all its outstanding duties on foreign-manufactured goods. In modern politics commercial treaties have taken a prominent place, especially since the Imperial Economic Conference of 1932. (See also IMPERIAL CONFERENCE; MERCANTILE SYSTEM.)

Recitativo. Declamation in singing, with fixed notes but without definite metre or time, comparable to prose inserted into *verso* drama. But although the notes are fixed by notation, they are not always, or should not always be, sung with full tone or even very definite intonation; on the other hand, although the time is free, in musical notation R. is generally written down by convention in 4-4 time, with bar-lines. There are, broadly speaking, 2 kinds of R., as follows: (1) *Recitativo accompagnato* (or *stromentato*), a type of R. accompanied by the orchestra, as distinct from *recitativo secco*, which in the 18th cent. was accompanied by a string bass and a harpsichord. *Recitativo accompagnato* served to modulate to or near the key of the set musical number, usually an aria, that followed it, and also to give the singer an opportunity for dramatic declamation. (2) *Recitativo secco*, a type of R. accompanied by a string bass and a harpsichord, mainly in 18-cent. It. or Italianate opera. The composer's score showed only the voice-part and a figured or unfigured bass; the harmony was supplied by the keyboard player according to conventional rules, and R.s were never intended to be of musical interest, but merely to advance the action without letting the music drop out altogether and give place to spoken dialogue. It also served to modulate from the key of one set musical number to the next.

Recklinghausen, Ger. tn in the Land of North Rhine-Westphalia (q.v.). In the Ruhr dist., 33 m. NNE. of Düsseldorf (q.v.). It belonged to the Hanseatic League (q.v.) in the Middle Ages, but its present prosperity dates from the 19th-cent. development of the neighbouring coal-fields. It has a port on the Rhine-Herne canal. There are coal, coke, tar, chemical, and iron industries. Pop. 121,900.

Reclam, name of a Ger. family of publishers (descendants of Huguenots from Savoy), of whom Anton Philip R. (1807-96) founded the R. publishing house in Leipzig, 1828. In 1807 books in pocket size were introduced (*Reclams Universal-Bibliothek*), the first vol. being Goethe's *Faust*. Only 1 year later vol. 120 appeared, and the successful library was rapidly enlarged until in 1942 the 7500th title was pub., a total of 280,000,000 copies having been printed since its introduction. The firm was severely damaged by bombs in 1943-4, but immediately after the War started anew in Stuttgart, building up again the universal library of world literature, which is once more the largest book-series in Germany. In 1956 a series of pocket art books was introduced. The house is now run by the founder's great-grandsons, Heinrich and Holf R.

Reclamation of Land, see **LAND RECLAMATION**.

Reclus, Elisée Jean Jacques (1830-1905), Fr. geographer, b. Sainte-Foy-la-Grande, suffered through his life because of his passion for liberty. Obligated to quit France in consequence of his republicanism in 1851, he spent 5 years (1852-7) travelling in the Brit. Isles and N. and Central America. He was associated with the balloonist Nadar, during the siege of Paris (1870), and was banished in 1872 because he had continued a member of the National Guard. A refugee in Clarens (Switzerland), he there composed nearly the whole of the 19 vols. of his admirable *Géographie universelle*, 1876-94. He advocated the abolition of marriage ceremonies. Other works include *Histoire d'un ruisseau*, 1869, and *Histoire d'une montagne*, 1880. See life by W. Nettlau, 1928.

Recluse, see **HERMIT**.

Recognition, in law, an obligation of record which a man enters into before some court of record or a magistrate, binding himself to do some particular act, e.g. to be of good behaviour for a specified period, to come up for sentence if called upon, to appear as witness, or to pay a debt (see **BAIL**). It resembles a bond, the form of it being, 'that A B doth acknowledge to owe to our lord the king, to the plaintiff, C D, or the like, the sum of £10 with condition to be void on performance of the thing stipulated.' If the condition of the R. is broken, the R. becomes forfeited, and is then *estrated* or extracted from the other records and sent up to the Exchequer. Then the party, and, if the R. was entered into with sureties, the sureties too, become the absolute debtors of the Crown for the sums for which they bound themselves. See also **PREVENTION OF CRIME ACTS**.

Reconnaissance (Fr. *reconnaître*, from Lat. *recognoscere*, to recognise), military term denoting the examination of the enemy's position or movements, or of the ground to be occupied. Tactical and strategic R.s are carried out by aircraft. When a large body of ground forces is employed, with the object of inducing the

enemy to show his hand, the operation is termed a R. in force. This is also a favourite euphemism for an abortive attack. Much R. is done by armoured cars in favourable terrain. In modern warfare the use of aircraft has, of course, vastly extended the possibilities of successful R., and indeed so revolutionised R. as to make secrecy of dispositions impossible without command of the air. Topographical R.s have for their object the securing of information on the peculiarities and details of the position, hills, rivers, cover, etc., and are carried out by skilled officers and men. The term R. is also applied to the preliminary surveying operations preparatory to the building of a railway, canal, etc. See also **PATROLS**.

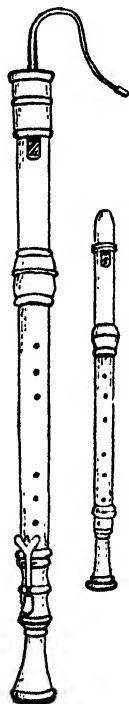
In the Second World War a Reconnaissance Corps was formed in 1941 and made part of the R.A.C. in 1943. It consisted of a number of units converted to armoured scout corps, and it performed valuable service. The Corps was disbanded in 1946. See J. Taylor, *This Band of Brothers*, 1947.

Record, or Court of Record. A court of R. is one 'where the acts and judicial proceedings are enrolled on parchment for a perpetual memorial and testimony' (Blackstone). The distinguishing mark of a court of R. is the power to inflict fines and to attach a person for any contempt of court; while the practical effect of the distinction between courts of R. and those not of record is that the rolls and records of a court of R. are incontestable evidence of what purports therein to have been done, whereas the proceedings of courts not of record must be proved like any other question of fact. The description goes back to the theories of royal authority, and originally the king's council or Curia Regis (q.v.) (see **PRIVY COUNCIL**; **CABINET**) was the only court of R. But gradually, as the different offshoots of that body developed, these, as being the king's courts, also became the courts of R. (see **ROYAL COURTS OF JUSTICE**), and their rolls absolutely authoritative save for inadvertent errors of an obvious kind. The courts of appeal (including the House of Lords) and the high court of justice constitute the superior courts of R., and the only inferior courts (q.v.) invested with the attributes of a court of R. are the co. courts. The House of Commons, though constitutionally a tribunal, is not generally regarded as a court of R., and, according to Sir Erskine May, the House has virtually abandoned its claim to the title. In a cognate sense the term R. means in judicial proceedings the written statement of the various steps in an action, from the issue of the writ down to the entry of final judgment, which is drawn up by an appropriate official. Where an action is settled out of court the R. is said to be 'withdrawn.'

Record Office, see **PUBLIC RECORD OFFICE**.

Records, Robert (c. 1510-58), mathematician. He taught at Oxford and Cambridge and was the author of one of the earliest standard Arithmetics, *The Ground of Artes*, c. 1540.

Recorded Sound, British Institute of. Most civilised countries have possessed archives of sound for many years, but in Britain no move was made until 1948. In 1955 the B. I. R. S. acquired premises of its own at 38 Russell Square, London, with the object of preserving and making accessible for study sound-recordings which are of permanent value, and its collection (numbering about 25,000 discs in 1955) comprises in the main normal commercial gramophone records transferred by the Central Music Library and other public bodies or presented by private donors. An agreement with the B.B.C. ensures that recorded broadcasts worthy of preservation will be deposited in the Institute.



RECORDERS

Recorder, old musical instrument of the fipple flute family, ranging from 8 to 1 ft. having a soft and sweet tone (whence known as *flûte douce*). The family includes not only true R.s. but the flageolet, tin-whistle, pipe (or tabor), and galoubet. Instruments of the true R. family had 8 finger-holes and a compass of about 2 octaves. It was a very favourite

instrument in Tudor times, and is referred to in Elizabethan literature, e.g. in *Hamlet* III. ii and *Midsummer Night's Dream* V. i. It became known as the *flûte-à-bec* or Eng. flute, and was subsequently superseded by the stronger-toned transverse or Ger. flute, but is now in use again, having been helped in England by the revival of interest in old music played on the original instruments and of the folk-dance. The flageolet resembles the *flûte-à-bec*, beak flute, or fipple flute, but with 2 of the 6 holes of that instrument at the back and closed with the thumbs. In shape it is a small pipe with a mouth-piece inserted in a bulb and produces a shrill sound, similar to, but much softer than, that produced from the *flauto piccolo*. Various said to have been invented in France and England, it was certainly in vogue in England from the late 17th to the early 18th cent. The *obbligato* in the song 'O, ruddier than the cherry' in Handel's *Acis and Galatea* is for a F. The ordinary 6-holed tin-whistle, which is a popular form of F., gives a good idea of the appearance and tone of its prototype. The R. is also an organ stop of 2 ft scales and wood pipes. See C. Welsh, *Six Lectures on the Recorder*, 1911.

Recorder, presiding judge of a bor. court of quarter sessions. A R. is appointed by the home secretary during good behaviour, and to be eligible must be a barrister of not less than 5 years' standing. The same person may hold the recordership for 2 or more bors. jointly, and may also occupy the position of co. court judge for the same or another dist., be revising barrister for the bor., and mayor, councillor, or stipendiary magistrate. The R. is the sole judge of the sessions, and the mayor or other justices of the bor. have no judicial authority whatever in the R.'s court, except that if the R. or his deputy be absent they can open and adjourn the court and respite recognisances. The remuneration of a R. is fixed by by-law or resolution of the bor. council.

Recorder, Siphon, instrument invented by Lord Kelvin to replace his mirror galvanometer for recording the variations in the minute currents of submarine cables, which form the signals. The pen is a siphon of vaccination tubing, the short limb dipping into an ink reservoir, the end of the long limb supplying ink to a moving ribbon of paper. The horizontal limb is enclosed in a small coil of wire through which the current passes, and is placed between the poles of an electro-magnet excited by a local battery. The ink bottle is electrified, and the paper ribbon carried on an insulated metal roller. The varying current moves the siphon and the electrified ink spurts upon the unelectrified paper, the tube not touching. The pen is not affected by the ordinary earth-currents passing through the cable.

Recording, or Dictating Machines, used mainly for dictation and transcription of correspondence, but may also record telephone conversations or conference pro-

ceedings. An executive speaks to the machine instead of to a shorthand typist and his voice is recorded on a wax cylinder (now largely obsolete) or electro-magnetic disk or tape; a typist transcribes this direct. Output can be amplified at will by a loudspeaker. R. M. can be operated from internal telephones to a central transcribing room.

Records Association, British, see HISTORICAL MANUSCRIPTS (COMMISSION).

Recovery of Land. The present method of recovering possession of land, whether from a tenant whose tenancy has been determined by notice to quit, or from any one else wrongfully in possession, is by issuing a specially endorsed writ in the high court and applying for leave to sign final and summary judgment by a summons under Order XIV of the Rules of the Supreme Court. Formerly the legal machinery for recovering land was cumbersome in the extreme, and it was in the last degree essential to distinguish between the recovery of possession and an action to try title. So technical and uncertain in operation were the old real actions for the trial of title (see REAL PROPERTY; PERSONALTY) that they very soon in the hist. of Eng. legal procedure became replaced by the personal remedy of ejectment (q.v.). Originally ejectment was an action brought by a lessee to repair the injury done him by having been dispossessed, and the various fictions by which it became adapted to the trial of titles to freeholds are a lasting monument to the barbarous inelasticity of the technical rules of the old Eng. common law. It was long a standing rule that no plaintiff should proceed in ejectment against a casual ejector without giving notice to the tenant in possession, if any, and joining him as defendant at his option. Then he had to make good 4 points, viz. the title of his landlord, his lease, entry, and the ouster or eviction, and, if he succeeded herein, the sheriff put him into possession. Thus the title of the lessor came incidentally before the court and suggested ejectment as an appropriate remedy for trying titles to freeholds. But soon the trouble and formality of actually making lease, entry, and ouster suggested the concoction of a string of fictions, beginning with the entirely false statement of a lease for a term of years by him who claimed title to 'John Doe,' the latter being the plaintiff, and the no less false statement that Doe entered as lessee and that the equally celebrated 'Richard Roe,' the defendant, casually ejected or ousted him. (For a complete statement of this curious and archaic procedure see Blackstone's *Commentaries*.) It was not till 1852, when the superior courts of common law were reconstructed, that the old action of ejectment was abolished and the new action for the R. of L. created. Except by leave, no claim other than for mesne profits (see MESNE) and arrears of rent can be joined with a claim for R. of L. Ejectment proceedings may also be taken in the co. court where neither the ann. value nor the rent payable exceeds £100.

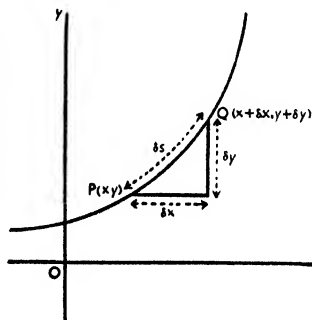
Where the rent does not exceed £20 and the term is for not more than 7 years, proceedings may be taken in a magistrates' court.

Recruit and Recruiting, see AIR FORCE, ROYAL; ARMY, *Commissions, Reserve Forces, Educational Training*; NAVY AND NAVIES.

Rectangle, quadrilateral (q.v.) plane figure of which the angles are all right angles and hence the opposite sides equal. The area of a R. is equal to the product of 2 adjacent sides.

Rectangular Projection, see MAPS.

Rectification, in chem., the process of purifying volatile spirits by fractional distillation; they are then known as rectified spirits. In mathematics, the



process of finding the length of curves. In the figure 1' is the point (x, y) ; Q , $(x + \delta x, y + \delta y)$. If s = the length of curve from some fixed point to P , $PQ = \delta s$, then $(\delta s)^2$

$$= (\delta x)^2 + (\delta y)^2. \text{ Hence } \frac{\delta s}{\delta x} = \sqrt{1 + \left(\frac{\delta y}{\delta x}\right)^2}$$

$$\text{i.e. in the limit } \frac{ds}{dx} = \sqrt{1 + \left(\frac{dy}{dx}\right)^2}$$

$$\therefore s = \int \sqrt{1 + \left(\frac{dy}{dx}\right)^2} \cdot dx, \text{ where } y = f(x);$$

or if polar co-ordinates are used, $(ds)^2 = (dr)^2 + r^2(d\theta)^2$,

$$\therefore s = \int \sqrt{r^2 + \left(\frac{dr}{d\theta}\right)^2} \cdot d\theta,$$

$$\text{or } \int \sqrt{1 + r^2\left(\frac{d\theta}{dr}\right)^2} \cdot dr,$$

where $r = f(\theta)$ and $\theta = F(r)$.

In the case of the catenary

$$y = \frac{c}{2}(e^{x/c} + e^{-x/c}),$$

$$\text{i.e. } y = c \cosh x/c, \text{ and } \frac{dy}{dx} = \sinh \frac{x}{c},$$

$$\therefore \sqrt{1 + \left(\frac{dy}{dx}\right)^2} = \sqrt{1 + \sinh^2 \frac{x}{c}} = \cosh \frac{x}{c}$$

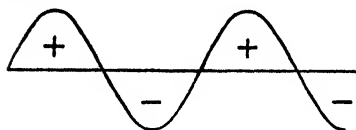
$$s = \int_0^x \sqrt{1 + \left(\frac{dy}{dx}\right)^2} \cdot dx$$

$$= \int_0^x \cosh \frac{x}{c} dx = c \sinh \frac{x}{c} = c \sinh \frac{a}{c}$$

if the limits are taken from the origin to the point where $x = a$. In practice, the length of curves is found by means of the opisometer (q.v.).

Rectified Spirit, alcohol which has been purified and strengthened by redistillation. In the Brit. Pharmacopoeia, R. S. contains 16 per cent by weight of water.

Rectifiers, devices for converting an alternating or oscillatory current into a unidirectional current. The alternating current may be represented as a sine-wave



and the action of the rectifier may be that of inverting the negative half-waves, producing a unidirectional current of the form



(full-wave rectification), or that of blocking the negative half-wave, producing a current of the form



(half-wave rectification). R. may be classified as mechanical, contact, and discharge R. Of the first, the rotating commutator is a full-wave rectifier and operates on the same principle as the commutator (q.v.) in the ordinary d.c. generator. A new type of commutator rectifier with rolling contact pieces instead of sliding brushes has recently been developed in Germany. In the vibrator rectifier a vibrating spring closes the contact during one half-wave and interrupts connection during the next, the vibration of the spring being adjusted to exact synchronism with the alternating current, and the motion being maintained by a magnet, as the buzzer in an electric bell. The contact R. depend for their action on the phenomenon that a potential difference develops in the very thin layer or interface between 2 chemically different substances in contact. A

zinc plate becomes positively charged in contact with a copper plate, the latter becoming negative. The theory of the electric double layer in the interface was developed by Helmholtz and provides an explanation of frictional electricity, endosmosis, electric charging of capillary tubes in which water is flowing, electrification of air bubbles in water, and water drops and spray in waterfalls. The effect is made use of in the copper oxide rectifier, the selenium, and the crystal R., of which the germanium rectifier is a notable example. Clearly if a potential difference is developed at a contact, current passes more easily in the direction of the potential difference, and the half-wave in the opposite direction is at least partially blocked. Contact R. are widely used in connection with instruments and apparatus where only small power amounts are involved. The electrolytic rectifier is capable of handling considerable power, and depends for its action on the unidirectional current in the cell (see ELECTROLYSIS). The various R. using electric discharges depend on the emission of electrons from the cathode, which is usually heated, either independently or by the current itself. In the thermionic valve the cathode is a filament heated by the current from a small battery, and the electrons emitted are caught by the (plate) anode; the current thus passes in one direction only. The thermionic valve is used as rectifier in wireless sets, cathode-ray oscillographs, and numerous other apparatus, and the modern type of 'thyatron' has been developed for high voltages and considerable power amounts. The discharge rectifier using a mercury pool as cathode and an iron or carbon anode is either operated in vacuum (mercury-vapour rectifier) or at atmospheric pressure (mercury-arc rectifier). In either case the arc has to be ignited by some means, and thereafter a luminous discharge continues to flow, keeping the mercury cathode hot, while the anode is usually cooled to prevent back-firing. The mercury-vapour rectifier is extensively used for converting high-voltage three-phase current into direct current in traction substations. In this application the rectifier usually has 3, 6, or 12 anodes placed in a ring with vertical axis, and the current is converted into current of a corresponding number of phases supplied to the anodes in turn. In this way the fluctuations in the direct current from the half-wave reversals are largely smoothed out. Mercury-vapour R. are built for d.c. voltages up to 2000 V, the a.c. voltage being stepped down in transformers. The large-size R. are usually built in sealed steel tanks, the vacuum being kept up by pumps. The mercury-vapour rectifier requires no attention; it can be automatically started and operated by telecontrol. The current is controlled by a grid, as in the thermionic valve. A modern type, the mutator, developed by Brown Boveri, may also be used for converting direct current into alternating current or three-phase alter-

nating current into single-phase alternating current. As a d.c./a.c. converter it will become an essential link in the various projected high-voltage, long-distance, transmission schemes.

Rector, clerk in holy orders who has the cure of a par., and has also full possession of all rights and privileges, including the tithes. A vicar, on the contrary, receives only a portion of the eccles. income. See BENEFICE.

Rectum, lower part of the large intestine. It commences at the end of the sigmoid flexure and extends to the anus. The term R. implies that this portion of the intestinal tract is straight, but in fact it has a distinct curve, bending backwards and again towards the front. The R. has 4 coats: the peritoneal, which is only present laterally and in front for some part of its course; the muscular, consisting of longitudinal and circular unstriped fibres; the submucous, consisting of arcolar tissue; and the mucous coat, which forms 3 folds called the *plicae recti*. The R. receives by peristaltic motion the residue of food material from the large intestine. An accumulation takes place until the mass produces a sensation which is interpreted as a desire to empty the R. This is accomplished by the relaxation of the interior and exterior sphincter muscles of the anus. The motion of defaecation is partly voluntary and partly involuntary; the exterior sphincter is relaxed by an effort of the will, but the inner muscles act involuntarily on receipt of the accustomed stimuli. If from any cause these stimuli evoke no response, the faeces are retained, producing the condition known as constipation. Many of the disorders to which the R. is liable are due to constipation (q.v.). The accumulation of impacted masses may lead to fissures, piles, and other local disorders, besides the general toxic effects. Obstruction of the R. is sometimes due to thickening of the mucous coat, foreign bodies, or strictures due to tumours, etc. In women the weakening of the tissues after parturition may lead to a hernia of the R. into the vagina.

Reculver, hamlet within the Herne Bay urb. dist. of Kent, England, on the N. coast of the co. There are remains of the Rom. Saxon shore fort of *Regulbium*. The medieval church was demolished in the last cent., save for 2 towers, known as 'The Sisters,' which were taken over by Trinity House to serve as a landmark. There are also remains of an interesting pre-Conquest church, columns and a carved stone cross from which are re-erected in Canterbury Cathedral.

Recurring Decimals, see DECIMAL FRACTIONS.

Red, regarded, with blue and yellow (q.v.), as a 'primary colour.' Artists use as R. pigments venetian, light and Indian red, red ochre, vermilion, and such animal and vegetable products as crimson lake, rose madder, and synthetic alizarin crimson (see also COLOUR and PIGMENTS). Red lead is used as a strong protective.

Red Admiral Butterfly, or *Vanessa atalanta*, Brit. butterfly with black wings crossed by scarlet bands and marked with white and blue spots. The spiny black caterpillar feeds on the nettle. The butterfly is not known to hibernates in Britain, immigrating in May and June.

Red Army, army of the Soviet Union. It had its origin as the army of the Russian Revolution of 1917, and it was called 'Red' Army because it bore the red flag of the revolution. The name was retained after the revolution, and the Soviet Russian Army is officially styled the R. A. of Workers and Peasants, or was so styled until late in the Second World War. In 1940 it numbered about 20,000,000 trained reserves, and soon became highly mechanised. Its air arm was estimated at 7000 first-line aircraft before the Second World War and the number of tanks at more than 10,000, but these totals were much increased as the War developed. It is to be doubted whether any army has adapted itself to modern war conditions as rapidly as did the R. A. during the 2 years 1942-3. Some developments were essential in order to offset the Ger. methods and to employ effectively new types of armament produced by factories, home and foreign; others were the outcome of a realistic policy of obtaining the means by which the human element provided by a quarter of a cent. of Soviet life could be harmonised with the old Russian military traditions. In the first group can be included measures determining in what conditions, and in the second in what state of mind, the soldier fights.

The Russian Army made a poor showing in the Finnish war of 1939-40. The result of that campaign was that Stalin and the high command undertook a reorganisation of the R. A., including a revision of formations, tactics, and command. Their chief aims were to improve tactics and weapons, and to improve leadership by a careful sifting of army corps and divisional commanders. Two other factors also contributed to their success: simultaneously with the overhauling of the R. A. the Soviet Gov. began to put into effect a scheme to transfer machinery, and indeed whole industries, eastward from the Ukraine, and particularly from the Donetz basin, and also to accelerate the expansion of the inner industrial fortress beyond the Urals. Later came the delivery of Brit. and Amer. war materials. In the Finnish war on the Karelian Isthmus the Russians relied upon massed artillery and steam-roller concentrations of tanks and infantry to break the Mannerheim line. In their long withdrawals from White Russia and across the Ukraine and the Don steppes they gradually perfected an elaborate method of defence in depth, and also anti-tank tactics to make use of their new anti-tank weapons. Eventually, in the winter of 1942-3, and in the summer campaign of 1943, they demonstrated that they could conceive and execute a well-timed offensive. One of the lessons

learned in Finland concerned the amount of authority that should be delegated to the political commissars. In 1941 and 1942, for the first 16 months of the Russo-Ger. campaigns, the R. A. operated with officers and commissars on the dual-command basis, but this command authority was finally removed in Oct. 1942, at the moment when Stalin was preparing the first great Russian counter-offensive. This move was prompted by a Ger. Army order that all political commissars should be shot after interrogation when captured. The Oct. decree provided that the most capable commissars should be withdrawn for courses at officers' training schools. By the spring of 1943 they were back again in active service, under the title of ordinary regimental and staff officers, but with their experience at the front supplemented by new technical knowledge. Meanwhile the remaining commissars and other new ones continued their former work, but there was now a single military command in every unit. Following this reorganisation, Stalin found himself confronted with the need of making changes in his high command. In Finland he had relied on his former comrade of civil war days, Marshal Voroshilov, with disappointing results. Similarly, Marshal Budenny had failed disastrously in the Ukraine. Both were withdrawn to train new armies in the rear. Later he took the same stern line with Marshal Timoshenko. It was in Aug. 1942 that Gen. Zhukov was appointed vice-commissar of national defence directly under Stalin. Until then that important post had been held by Timoshenko. The change was due to the catastrophically swift Ger. break-through at Rostov on 25 July, 1942. The disaster at Rostov revealed where fatal weakness still existed in the R. A. machine and paved the way for the great recovery between Nov. 1942 and Feb. 1943. The defence of Stalingrad was entrusted to younger gens., men of strong physique and greater competence, men like Chulikov, Rodimtzev, who became heroes of Stalingrad, Lelinschenko, the hero of Rzhev, and Malinovsky, the leader on the S. front. After the Ger. and Ger. satellite armies had been flung back across the Donetz the veil of anonymity was lifted. Stalin had emerged as a marshal. Zhukov had also now attained his rank. Vasilevsky, promoted to marshal in Feb. 1942, was chief of staff. It was these 3 who planned the great counter-offensive. Now, like Napoleon, Stalin distributed the laurels after they had been won, to Marshal Nikolai Voronov, chief of artillery, and to a growing list of gens., men like Rokossovsky, Vatutin, Golikov, Tolbukhin. The significance of the victory at Stalingrad and the successful winter offensive which followed can scarcely be exaggerated. The R. A. had proved its ability at defence in depth. Now it revealed its mastery of great encircling movements and annihilation tactics. Coincident with its purely military evolution the R. A. had also undergone

changes of psychological and political importance. It had much less than formerly the conformation and appearance of a workers' and peasants' army, and most of the distinctions of work and uniform characteristic of tsarist days had now been restored. The general war-time development of the R. A. was in the direction of greater centralisation and unity of command. By the end of the war major formations had become much more uniformly composed and rigidly organised than in other armies. The army groups (known as 'fronts') were commanded by marshals and divided into armies under colonel-gens.; corps had been practically eliminated and armies almost all consisted of 6 divs., which by W. standards were deficient in artillery. The divisional field artillery (both guns and howitzers) was of light calibre, but there existed great quantities of G.H.Q. artillery of all calibres. This was organised in large bodies up to divisional size and together with the armoured troops could be handled in masses by G.H.Q. or fronts on almost strategic scale.

In the immediate post-war years measures were taken to integrate the Soviet armed forces. In 1946 all 3 services were placed under a single Ministry of the Armed Forces. There was a reversal of this policy between 1950, and 1953, but since then a Ministry of Defence has been created (see STAFF, MILITARY). For the campaigns of the R. A. in the Second World War see EASTERN FRONT, OR RUSSO-GERMAN CAMPAIGNS, IN SECOND WORLD WAR. See E. Wollenberg, *The Red Army, 1940*; D. F. White, *The Growth of the Red Army, 1944*; W. Kerr, *The Russian Army, 1944*; Colonel L. B. Ely, *The Red Army Today, 1949*; Gen. A. Guillaume, *Soviet Arms and Soviet Power, 1949*; R. L. Garthoff, *How Russia Makes War: Soviet Military Doctrine, 1954*; Capt. H. B. Liddell Hart (ed.), *The Soviet Army, 1956*.

Red Bush Pig, see RIVER HOG.

Red Cedar, see JUNPERUS.

Red Clay, one of the most widespread deposits found on the floor of the deep sea, a fine clayey material accumulating very slowly as a result of the settling of wind-blown dust which is largely of volcanic origin.

Red Comyn, see COMYN.

Red Cross, The, organisation for the relief of suffering, owes its inception to the Swiss banker Jean Henri Dunant, who, moved by the sufferings of the wounded at the battle of Solferino (June 1859) pub. *Un Souvenir de Solferino, 1862*, urging the formation of voluntary aid societies, with a permanent existence, to succour the wounded in time of war. As a result an international conference was held in Geneva in 1863, attended by delegates from 16 European countries, and followed in 1864 by a diplomatic conference which signed the first Geneva Convention. As an emblem of neutrality the convention adopted a red cross on a

white ground (the colours of the Swiss flag reversed) and the motto 'Inter Arma Caritas.' The use of the red crescent in Turkey, Egypt, Iraq, Jordan, the Sudan, Syria, Tunisia, Afghanistan, and part of the U.S.S.R., and of the red lion and sun in Iran, has been approved. The supreme authority of the R. C. is the International Conference, which meets every 4 years, and is attended by delegates of the R. C. and Red Crescent societies, the International R. C. Committee, the League of R. C. Societies, and representatives of the governments signatory to the Geneva Convention. The International R. C. Committee is composed of 25 Swiss citizens, and has its seat in Geneva. Its main functions are to promote the adherence of states to the Geneva Conventions, to afford recognition to new societies, to create international agencies in war-time for the relief of victims of war, especially prisoners-of-war, and to maintain fundamental R. C. principles. The League of R. C. Societies, founded in 1919, is best described as a 'parliament' of national societies linked for purposes of co-operation and mutual assistance in peace. Present membership is over 75 R. C. and Red Crescent Societies.

Since 1864 the original Convention has been revised 3 times, once in 1906, again in 1929, when a Prisoners of War Convention was also drawn up, and finally in 1949, when the plenipotentiaries of 61 Powers drew up and signed 4 Conventions. So far, the Conventions have been ratified by over 50 countries. The principle of the First Geneva Convention is that sick and wounded combatants in war, whatever their nationality, should be respected and cared for; that the personnel looking after them, the buildings which shelter them, the equipment needed for them, and the transport conveying them should be protected; and that a distinctive emblem should be the symbol of this immunity, which is granted only under the conditions laid down in the various clauses of the Convention. The emblem is the distinctive sign of the Medical Services of the Armed Forces, and protection under the First Convention may be claimed only in respect of medical personnel, buildings, equipment, and transport when operating as part of those Medical Services.

The Second Geneva Convention is an extension of the principles of the First Geneva Convention to maritime warfare. It covers a similar field and protects similar categories of persons, including shipwrecked persons, as the First Convention. It brings up to date the Hague Convention of 1907.

The Third Geneva Convention for Prisoners of War, while covering much the same ground as the original Prisoners of War Convention of 1929, incorporates the amendments found necessary as a result of experiences in the Second World War.

The Fourth Geneva Convention is entirely new, and represents the culmination of efforts over many years to prepare

a Convention for the protection of civilians.

The Brit. R. C. Society was first active in 1870, and was granted a royal charter of incorporation in 1908 setting out that the primary object of the Society was to furnish aid to the sick and wounded in time of war. During the First World War a joint committee of the Brit. R. C. Society and the Order of St John was estab. to co-ordinate the work of the 2 bodies, and extensive help was given to the Medical Services of the Crown. In 1919 a Supplementary Charter extended the Society's objects to include work in peace-time for improvement of health, the prevention of disease, and the mitigation of suffering throughout the world. A variety of peace-time tasks was undertaken between 1919 and 1939, while always training and preparing for an active organisation to be ready in the event of another war. Other activities, such as welfare for disabled ex-Servicemen, hospital libraries, and ambulance services, continued to be administered jointly with the Order of St John. From 1939 to 1945 a joint War Organisation of the 2 bodies was again responsible for the very extensive war-time work, including care of the sick and wounded servicemen and women, civilians, prisoners-of-war, refugees, and the homeless. Volunteers were trained in first aid and nursing and helped with civil defence work, to staff hospitals, first-aid posts and ambulances, and welfare officers were posted to service hospitals; convalescent homes were opened.

The peace-time work of the Brit. R. C. Society falls within the following categories: (i) first aid: road posts; ambulance duty; beach huts; airfields; sporting fixtures; camp sick bays for cadets, scouts, guides; dispensaries in hospitals, industrial undertakings, cinemas, and entertainments; (ii) nursing in hospitals, homes, and clinics; nursing aid service under the supervision of district nurses; blood-transfusion service; medical loan depots; (iii) welfare: hospital welfare; escort duty; home visiting; diversional handicrafts; work for invalid and crippled children; picture library; care of children; old people's homes and clubs; clubs for the disabled; meals-on-wheels; (iv) immediate relief in disasters, floods, fire, major accidents, etc.; (v) work carried out under the joint committee. In addition, welfare work in service hospitals is carried out by the Society and Order of St John jointly; (vi) the national reserves. The work of the R. C. is carried out by Voluntary Aid Detachment members (men and women), members (those who support the Society by giving part-time services other than as Voluntary Aid Detachment members), associates (who support the R. C. by contributing to the Society's funds), and the Junior R. C. membership, which was founded in 1915: (a) cadets (boys and girls between 11 years old and school-leaving age, under the special charge of a Cadet Officer and attached to a senior

detachment); (b) link members (links are formed in schools or juvenile organisations, between the ages of 6 and school leaving). There is a special Junior R. C. badge and a motto: 'Serve One Another.' The objects of the Junior R. C. are to keep themselves and others in good health, to give aid and comfort to sick and suffering, and to link together children of all countries in international friendship. A branch of the Brit. R. C. Society exists in every co. throughout England and Wales. There are central council branches in Scotland, N. Ireland, and the Isle of Man. The national H.Q. is at 14 Grosvenor Crescent, London, S.W.1.

The Brit. R. C. has over 40 overseas branches in the Colonies. The need for R. C. work is fully recognised in the Brit. Commonwealth, the most urgent being in health and hygiene and disaster relief. Clinics, dispensaries, convalescent homes, and crèches have been estab. according to specific needs. Overseas branches are also undertaking pioneer work in leper colonies and in blood transfusion. The Junior R. C. is active and is enthusiastically supported.

The Amer. National R. C., organised in 1881, conducts a national programme of disaster relief, services for the armed forces, veterans, and their dependents, and a wide range of health and safety services for the well-being of the people of the nation. More than 1,500,000 volunteers carry out these activities each year. R. C. programmes and activities are supported by voluntary contributions of the Amer. people. Each year's membership consists of all adult citizens contributing \$1 or more. In 1955 there was 23,000,000 adult members, and 21,000,000 Junior R. C. members enrolled through the schools.

Currently the organisation spends about 40 per cent of its ann. budget in providing services for servicemen, veterans, and their dependents. During 1955, the most costly disaster year for the organisation, R. C. spent nearly \$30m. in 270 disaster operations. Emergency relief was given to 336,000 persons, and more than 35,000 families were aided through assistance in rebuilding, repairing, and refurbishing homes; providing equipment and maintenance; meeting medical and hospital bills; and helping small businesses to recover. The R. C. blood programme supplied nearly half the nation's hospitals with blood in addition to meeting defence needs. An average of 2,000,000 blood donations are contributed by the Amer. people each year.

The Amer. R.C. operates under a charter granted by the U.S. Congress in 1900, and last amended in 1947. The governing body of the organisation is a 50-member Board of Governors, 8 of whom are appointed by the President of the U.S.A.; 30 are elected by chapters, and the remaining 12 by their fellow board members. The President of the U.S.A. is honorary chairman of the Amer. R. C. National H.Q. are in Washington, D.C., and there are more than 3,700 chapters in

communities throughout the U.S.A. and insular territories. The accounts of the Amer. R. C. are audited by the Dept of Defense.

Red Cross. The Royal, decoration for nurses instituted by Queen Victoria in 1883. It consists of a crimson enamel cross, gilt-edged, fastened by a bow of dark-blue ribbon, red-edged, of width 1 in. It is conferred on nurses or other persons, either Brit. or foreign, recommended by the secretary of state for war on account of services in nursing and providing for sick and wounded soldiers or sailors.

Red Currant, see CURRANT.

Red Deer, city (incorporated in 1913) of Alberta, Canada, 90 m. N. of Calgary, on the Canadian Pacific Railway and the Canadian National Railway, in the valley of the R. D. R. The city supports a large mixed farming dist. The Central Alberta Dairy Pool Condensery is located in R.D., and is the only concentrated milk producer in the prov. Pop. 10,790.

Red Deer, or *Cervus elaphus*, large deer widely distributed throughout Europe, Asia, and N. Africa. It is a native of Britain, occurring still in the Scottish Highlands and the W. of England, while it is preserved in a number of parks. A full-grown male (stag or hart) stands 4 ft high at the withers, and typical antlers measure about 32 in. in length and 32 in. greatest width. When fully developed they have brow, bay, and tray tines. Remains of R. D. which have been dug up in Brit. peat beds show that they were much larger and the antlers finer than is now the case. This is due partly to lack of sufficient food, and to the injudicious practice of shooting the best animals, leaving inferior ones to perpetuate the race. The antlers are shed in April or May, and a few days afterwards the new growth shows. While the new antlers are developing they are covered with a thick velvet, and while in this condition are very sensitive. They are full grown in about 12 weeks, and the 'velvet' is then rubbed off. It is well known that cast horns are chewed and eaten by deer. Hornless stags sometimes occur. During the breeding season the colour is a rich brown, turning grey at the approach of winter. The young are spotted with white.

The hangul or Kashmiri R. D. is known to sportsmen as 'barasingh.' The principal differences between this R. D. and others of its tribe is the possession of a yellow rump patch and the fact that the 'beztine' (secondary antler point) on each horn is bigger than the brow; also the hangul is larger than his Brit. relative and equal to the deer of E. Europe, Asia Minor, and the Caucasus. The stag stands at about 52 in. at the shoulder. It sheds its horns in spring and begins growing them again so rapidly that by late May they have hardly more than 2 in. to add to the beam. Ten points is a normal number, and a good head should be over 40 in. from the burr to the tip of the largest tine. In a fight between a stag with hinds and another stag, the two fight furiously with heads low and horns locked, each trying

to throw the other to one side downhill. The finest stags never quit the forest, 'calling' frequently, and living with a single hind or a succession of them. Unfortunately, with the relaxation of all forms of game preservation in Kashmir, the R. D. will be the first of the hill game to be shot down, especially as their venison commands a high price in Srinagar.

Red Eye, see RUDD.

Red Guards, armed units composed mainly of factory workers, which in 1917 were used by Bolsheviks to seize power in Russia. See OCTOBER REVOLUTION.

Red-headed Poker, see POCHARD.

Red Indian Languages, see NORTH AMERICAN NATIVE LANGUAGES.

Red Indians, see AMERICAN INDIANS.

Red Irish Setter, see SETTER.

Red Lead, see LEAD.

Red-letter Days, greater festivals of the Church's year, which in the old MSS. or early printed eccles. calendars were inscribed in red. Apart from Sundays, there are no less than 29 R. D. in the Anglican Book of Common Prayer, described as 'all the Feasts that are to be observed in the Church of England.' The meaning of this is obscure, since there are a number of minor Saints Days in the calendar printed in black (black-letter days), though no special order of service is appointed for them as for the R. D. If the black-letter days are meant to be observed at all, then the R. D. must be to some extent equivalent to the Rom. Catholic Days of obligation (of which there are 9 in this country) when the faithful are required as a solemn duty to attend Mass. Anglicans indeed have the right to withdraw their children from school for religious purposes on R. D., though in practice this is not done except on Ascension Day. The distinction between R. D. and black-letter days has, since the Oxford Movement, been interpreted as equivalent to that between feasts of the first and second class or simple and double feasts in the Missal and Breviary. The term has hence come to signify a very lucky day. See BLACK-LETTER DAYS.

Red Poll Breed, see CATTLE.

Red River, important W. trib. of the Mississippi, takes its rise in Staked Plateau, Texas, passing through a famous canyon, 100 m. long and 1000 ft deep. It later forms the boundary between the states of Oklahoma and Texas, then flows through Arkansas and Louisiana, and enters the Mississippi about 300 m. above the Gulf of Mexico. It forms, during its lower course, numerous lakes and bays which abound in fine fresh-water fish; it takes a curious winding course, and has a length of about 1300 m., of which 1200 m. are navigable. It is called after the colour of the water, which is in some parts of a reddish shade owing to a sediment which forms in the basin of the riv.

Red River, prin. riv. of Tonking (q.v.) in whose extensive alluvial delta lives the bulk of the pop. of Tonking. Rising in Yunnan, it joins the Black R. in Tonking and enters the Gulf of Tonking through

several mouths. Its volume is irregular, reaching an average flow at Hanoi of 11,250 cub. metres in Aug. and dropping to 1,050 cub. metres in Mar., and its waters carry large quantities of reddish sediment. In 1870-1 the French explorer Jean Dupuis discovered a route from the sea to Yunnan along the R. R. His efforts to open this route to shipping caused a conflict with the Vietnamese Gov., which led to France's establishing a protectorate in Tonking. See P. GOURON, *Les Paysans du Delta Tonkinois*, 1936.

Red River of the North. This riv. flows through the U.S.A. and Canada. It forms the boundary between Minnesota and N. Dakota, and has as tribes, the Goose, the Sheyenne, the Wild Rice, the Marsh, and the Red Lake Rs. Its total length is 660 m., of which 520 are in the U.S.A. At first it flows SW., then makes a great curve, joining the Bois de Sioux R. It then joins the Assiniboine near Winnipeg, and empties itself into that lake. The plain it traverses was once Lake Agassiz, and is now a fertile agric. dist. (see MANITOBA).

Red River Settlement. This famous settlement is now part of the prov. of Manitoba. The settlement originated in a migration scheme planned by a young Scots nobleman, the Earl of Selkirk (see SELKIRK, THOMAS DOUGLAS, fifth EARL OF) to help clansmen who were living in the Highlands in poverty and without land. He began by sending 800 men to Prince Edward Is., but, conceiving more ambitious dreams, he turned to the valley of the Red R. with the idea of starting a settlement in the heart of the fur-trading empire. He bought shares in the Hudson's Bay Company in 1811 and received from the company a grant of 116,000 sq. m. of land, covering parts of what to-day constitute Manitoba, N. Dakota, and Minnesota. In the same year Selkirk's first party sailed to Hudson Bay under the command of Miles Macdonell, a Glengarry highlander, and selected for the H.Q. of their colony a spot which now lies within the modern city of Winnipeg, and named it Point Douglas in honour of Selkirk. Selkirk's grant of land, however, lay directly across the NW. Company's (see under HUDSON'S BAY COMPANY) for the hist. of the rivalry between the two fur-trading companies) main highway to the far W., and was, in effect, a gesture of defiance. The crisis came in 1814, when Governor Macdonell issued an order forbidding the exportation of pemmican from Selkirk's ter., claiming that it was needed for food. The Métis, or half-breeds, whose livelihood depended chiefly on making pemmican for the fur trade, and the NW. Company construed this as a declaration of war, and in the ensuing 2 years the colony was twice destroyed. In 1815 crops were trampled down, houses burned, and Macdonell and most of his settlers were transported to the NW. Company's H.Q. at Fort William and to Upper Canada. In the same year more settlers arrived through Hudson Bay

under Governor Semple, but he and a score of his men were massacred by the half-breeds at Seven Oaks (close to Winnipeg's Main Street). At this point, however, Selkirk had started out from Montreal with 100 Swiss soldiers of the De Meuron regiment, which had just been disbanded after serving in the war of 1812. With their help Selkirk seized the NW. Company's H.G. at Fort William, and planted his colony for the third time. In 1817 he signed the first treaty in the NW. for obtaining land from the Indians, the latter giving up their claim to a strip of land along the Red and Assiniboine Rs. In this period Selkirk did much to establish the settlement, planning roads and bridges, setting aside sites for schools and churches, and seems even to have entertained the idea of an experimental farm. After leaving the colony, however, he became involved in lawsuits on account of the seizure of Fort William, and died a broken man, having spent over \$500,000 and sacrificed his life in the struggle to establish a permanent settlement; but at least he had laid the foundations of the eventual colonisation of W. Canada, and to-day his name is honoured among the founders of the prairie provs. The union of the rival fur-trading companies in 1821 brought peace, but for some years longer the pioneer settlers faced grim hardships from storm, floods, and frost. They persisted in the face of all difficulties, climatic and economic, and, by 1826, numbered about 1500 in all, including some Métis farmers. But they could buy or sell next to nothing in those days, as the Hudson Bay route was too costly for anything but the fur trade, and wheat, even though the best in the world was to be grown in the prairie, could not be sold until the advent of the railway. For over 50 years the buffalo herds were a mainstay of the colony, for the animals supplied meat for settlers and fur traders, while buffalo robes were sold in great quantities in the U.S.A. See G. W. Brown, *Building the Canadian Nation*, 1942; W. L. Morton, *History of Manitoba*, 1956.

Red Sea, or Arabian Gulf, branch of the Indian Ocean, running NNW. from the Gulf of Aden for about 1200 m., extending from 12° 40' to 30° N. lat. It has Arabia on the E.; Abyssinia, Nubia, and Egypt on the W.; and is connected with the Mediterranean on the N. by the Gulf Canal, where it divides into 2 branches or gulfs, those of Suez and Akaba. The prin. harbours are: on the Arabian coast, Jiddah (the port of Mecca), Hodeida, and Mocha; on the African coast, Suez, Kossier, Suakin, and Massowa. The atmosphere is extremely hot in the warm season, and the winds which vary the current are alone responsible for the slight tidal phenomena. After the opening of the Suez Canal in 1869, which connected the R. S. with the Mediterranean, trade in European vessels increased.

Red Setter, see SETTER.

Red Spider (*Tetranychus telarius*), tiny reddish suctorial mite, not a true spider, which causes much damage to plants,

especially those in dry greenhouses, by sucking the sap from the leaves, causing them to become yellow and die. It is prevented by keeping the atmosphere moist, and is killed by fumigating the structure with nicotine or cyanide of potassium. Infested leaves can be cleaned by sponging with soft soap and water.

Redbird, see CARDINAL-BIRD.

Redbourn, vil. of Herts, England, 4 m. NW. of St Albans. The church, begun in the 12th cent. and partly rebuilt in the 15th, has a very beautiful screen. Pop. 3000.

Redcar, municipal bor. in the N. Riding of Yorks, England, 8 m. NE. of Middlesbrough. It is a popular seaside resort, with good sands and bathing and golf links. Race meetings are held. Pop. 27,500.

Redcliffe, tn of Queensland, Australia, so named by Matthew Flinders in 1799 because of the red cliff which he discerned when entering Moreton Bay. It is a peninsula with bayside beaches, within 25 m. of Brisbane, and connected to the mainland by the Hornibrook highway. R. was the first white settlement in Queensland. Pop. 13,785.

Redd is the term applied to the stones which are picked out in the process of sorting coal (see COAL MINING). Where collieries are situated near a beach the R. heaps or 'bins' gradually jut well into the sea, and by the action of tides and currents some of the material is first swept seawards and later washed ashore—sometimes to a depth of 15–20 ft—as 'redd coal' or sea-coal.

Redditch, tn of Worcestershire, England, 16 m. S. of Birmingham. Its chief manufs. are needles and fishing tackle and motor cycles, bicycles, and springs. Pop. 30,500.

Rede, riv. of Northumberland, England, rising in the Cheviot Hills and flowing 21 m. SE. to join the North Tyne near Bellingham. Redesdale is a most picturesque valley.

Redemptionists, see TRINITARIANS.

Redemptorists, or Liguorians, congregation of missionary priests founded in 1732 by St. Alphonsus of Liguori. It spread rapidly through Europe, especially after the suppression of the Jesuit Society in 1773. It was founded especially for work in country dists., and has many houses in England.

Redesdale, John Freeman Mitford, first Baron (1748–1830), lawyer, b. Holborn, London, son of John Mitford. Called to Bar, 1777, in 1780 he pub. a famous treatise on chancery practice. He was successively M.P. for Beer-Alston, 1788; a Welsh judge, 1789; solicitor-general and knight, 1794; attorney-general; M.P. for E. Looe, 1799; Speaker of the House of Commons, 1801; lord chancellor of Ireland and a peer, 1802–6. He opposed Catholic emancipation.

Redgrave, Michael Scudamore (1908–), actor, b. Bristol, educ. at Clifton College and Magdalene College, Cambridge, married Rachael Kempson. He began as a schoolmaster at Cranleigh

School, and made his first stage appearance with the Liverpool Repertory Company at the Playhouse, Liverpool, 1934. His first London appearance was with the Old Vic, 1936, as Ferdinand in *Love's Labour's Lost*. By 1940, after a number of West End successes, he had become one of the leading actors of the day. He joined the R.N. as Ordinary Seaman in 1941. Since then he has had a most distinguished career on both stage and screen, having been leading man at the Shakespeare Memorial Theatre, Stratford-on-Avon, and at the Old Vic, and is well known for his performances as Antony, Hamlet, and Lear. Among his outstanding films are *The Stars Look Down*, *Thunder Rock*, *The Browning Version*, *The Importance of Being Earnest*, and *The Dam Busters*. He won the Award of the American National Board of Film Review for his performance in *Mourning Becomes Electra*. He is an actor of much distinction and versatility whose methods are essentially modern. He can create an air of tension and suspense in a way few can equal. Author of *The Actor's Ways and Means*, 1953.

Redlands, city in San Bernardino co., S. California, U.S.A., 6 m. SE. of San Bernardino. It is engaged chiefly in fruit-growing and canning, and is the seat of the Univ. of R. Pop. 18,430.

Redmond, John Edward (1856-1918), Irish statesman and leader of the Irish Nationalist party. Of an Anglo-Norman family, long settled in Wexford, R. was b. at Ballytrent in that co., son of Wm Aroher R., M.P., a follower of Isaac Butt (q.v.). Educ. at Clongowes and Trinity College, Dublin, he entered the civil service, and was clerk in the Vote Office of the House of Commons. R. was elected as Nationalist member for New Ross, 1881; sat for N. Wexford, 1885-91. He was called to the Bar in England, 1886, and in Ireland, 1887. In 1891 he became M.P. for Waterford. He was Irish parl. whip at the time of the split in the Nationalist party after the Parnell-O'Shea divorce case, and remained with the Parnellite minority, in 1891 becoming their recognised leader. At the reconciliation in 1900 he was chosen chairman of the United party. In July 1914 he and John Dillon (q.v.) took part in the abortive conference at Buckingham Palace. He supported the Brit. Gov. when the First World War broke out, but the real Irish movement was now Sinn Féin (q.v.) and the assurances R. honestly gave to Birrell, chief secretary for Ireland, were (to some extent in consequence of the attitude of the War Office towards Irish volunteers) falsified by the Dublin revolt of Easter 1916, which took R. by surprise. An agreement then made with Asquith and Lloyd George to bring Home Rule into instant operation with exclusion of the 6 N.E. cos. was repudiated by other members of the Cabinet, and R.'s prestige in Ireland sank. In the All-Ireland Convention of June 1917 his policy of acceptance of terms then offered was outvoted by the more thoroughgoing Nationalists

under Devlin. As a delegate from the convention, he went to London, Feb. 1918, but was immediately taken ill, and died 6 Mar. His son, W. A. R., sat in the House of Commons for E. Tyrone, 1910-18, and for Waterford, 1918-22, and represented Waterford in Dail Eireann (1931). R.'s *Speeches* were pub. 1900. See HOME RULE; PARNELL; see also S. Gwynn, *John Redmond's Last Years*, 1911; and lives by W. B. Wells, 1919, and D. Gwynn, 1932.

Redol, António Alves (1911-), leading Portuguese novelist of the social realist school. In a robust style, often tinged with a lyrical note, he portrays the struggle of the peasant for the land, the rise and decay of the Port wine business and its reflection upon the poor classes. *Olhos de Água*, a story based on the impact of industrialism on a small vil., remains one of his best novels.

Redon, tn in the dept of Ille-et-Vilaine, France, on the R. Vilaine and the Nantes canal. It grew up around a 9th-cent. abbey. It has fisheries and a coasting trade, and manuf. agric. machinery and optical instruments. Pop. 7400.

Redonda, islet of the Lesser Antilles, Antigua presidency, NW. of Montserrat. There are phosphate and aluminium deposits.

Redoubt, name applied to military works entirely enclosed by earthworks. They were used principally for the purpose of resisting infantry attacks, and were seldom used as defensive works, since they offered so simple a target to the opposing artillery. They usually had a parapet of from 3 to 6 ft in height, deep trenches in the rear, and usually constructed shelter pits. A could be easily constructed in less than 24 hrs and would have a garrison of 2-4 companies of infantry. They were commonly used as supports for the second line of defence, or in order to keep the line of communication open. The word is still current in military parlance, but only metaphorically, e.g. 'Alpine R.' where certain elements of the Ger. high command intended to hold out in 1945.

Redpoll, or **Redpole** (*Carduelis flammea*), smallest Brit. finch, characterised by the deep crimson crown of the head and vermilion breast. It is gregarious, and migrates to Britain in the autumn.

Redruth, tn of Cornwall, England, 9 m. SW. of Truro. This tn lies in the centre of the mining dist. of Cornwall, and its trade is connected with the tin- and copper-mining industries; there is a school of mines near by. Near the tn are Carn Brea, a hill with Druidical remains and castle ruins, and Gwennap Pit, where John Wesley preached. Pop. 11,000.

Redshank, see SANDPIPER.

Redstart (*Phoenicurus*), genus of warblers. The common R. (*P. phoenicurus*) is a summer visitor to Britain, nesting in hollow trees, where it lays about 6 greenish-blue eggs with red spots. Its upper parts are dark grey and the forehead pure white, the throat is black and the upper parts rust red. The black-

capped R. (*P. tilys*) also visits Britain. Its upper parts are deep bluish grey and under parts black. See J. Buxton, *The Redstart*, 1950.

Reducing Agent, in chem., a substance which takes away oxygen; or, more generally, a substance which abstracts electro-negative elements or groups, as oxygen, sulphur, chlorine, bromine, iodine, and fluorine. Reduction is aimed at in the smelting of ores which contain oxides. If, for example, powdered litharge (lead oxide) be mixed with charcoal in the proportion of 10 to 1, and the mixture be heated in a crucible, the oxygen of the litharge will combine with the carbon to form carbon monoxide, leaving metallic lead. Carbon is in this instance the R. A., as it has abstracted the oxygen from the oxide. The chief R. A.s are hydrogen, carbon, potassium, sodium, aluminium, magnesium, hydrides of iodine, sulphur, phosphorus, etc. A R. A. of wide application in organic chem. is hydrogen in the presence of finely divided nickel, the latter acting as a catalyst (q.v.). In commercial chem. this process is used in converting inedible oils (e.g. cotton-seed oil) into edible fats suitable for use as artificial lard and as constituents of margarine.

Reductio ad Absurdum, in formal logic, an indirect demonstration founded upon the impossibility of a contradictory supposition. Euclid constantly employed this mode of indirect reduction in the proof of his geometrical propositions. The process first supposes the conclusion of a syllogism to be false, and its contradictory true, and then constructs a new syllogism leading to a conclusion contradictory of one of the original premises. Most logicians now condemn this and analogous processes on the ground that in strict logic it is absurd to question the truth of one's own premises, inasmuch as the very purpose of all argument or syllogism is to deduce a conclusion which will be true when the premises are true, not when they are false.

Reduction. In Scots law the appropriate action for setting aside a document or writing is one of R. The usual grounds are that the grantor was a minor, inhibited (see INHIBITION), interdicted (see INTERDICT), deceived, or otherwise improperly drawn into granting it, or that the requisite solemnities were not performed, or that it was granted in prejudice of the rights of creditors. The rights of innocent third parties are generally safeguarded by the court.

Redundancy, see PLEONASM.

Redwald (fl. 616), King of the E. Angles. Little is known of him: Ethelbert of Kent persuaded him to be baptised. He is chiefly notable for having defeated and slain Ethelfrid (q.v.), King of Northumbria, in AD 616, at a battle on the Idle R., and thereby restored to his throne Edwin (616-32), son of Ella of Deira.

Redwater, tn in Alberta, Canada, about 35 m. N.E. of Edmonton. Oil was discovered here in 1948, and R. is now the largest of the complex of oilfields surround-

ing Edmonton. The original recoverable reserves were about 700,000,000 barrels, and production in 1955 was over 28,000,000 barrels.

Redwing (*Turdus musicus*), thrush somewhat smaller than the song thrush and with an inferior song. Its back is darker than that of the common thrush; the feathers beneath the wings are a bright rust colour, and there is a distinct white line over the eye. It is a winter visitor to Britain, and breeds in N. Russia, Siberia, and Scandinavia.

Redwood, see SEQUOIA.

Ree, Lough, an expansion of the Shannon, 15 m. long and 1-7 m. wide, between Cos. Roscommon and Longford, Rep. of Ireland. L. R. is studded with islands and has many historical remains of anct churches and monasteries. It is now part of the Shannon scheme.

Reed, Sir Carol (1906-), film director, b. London, educ. at King's School, Canterbury; married first Diana Wynyard, the actress, then Penelope Dudley Ward, also an actress. His first appearance on the stage was in 1924; he played small parts until he joined Edgar Wallace as actor and producer in 1927. He went into film production in 1930. His films have included *Bank Holiday*, *The Stars Look Down*, *Night Train to Munich*, *Kipps*, *The Young Mr. Pitt*, *The Way Ahead*, *Odd Man Out*, *The Fallen Idol*, *The Third Man*, *Outcast of the Islands*, and *A Kid for Two Farthings*. He was a director with the Army Kinematograph Service, 1942-5, and directed *The True Glory*, a picture of the war from D-Day to V-E-Day. He was knighted in 1952.

Reed, Edward Tennyson (1860-1933), caricaturist and black-and-white artist, son of Sir Edward R., naval architect and M.P. for Cardiff. He was educ. at Harrow, travelled widely in China, India, and Japan, and became an artist in black and white. In 1899 Sir F. C. Burnand appointed him to the staff of *Punch* and for many years drawings signed 'E. T. R.' were familiar to readers of the periodical. His most popular drawings were the Contrasts series, 1890-1; his series Prehistoric Peeps were begun in 1893, and he was parl. caricaturist after that date. His pubs. were *Mr Punch's Prehistoric Peeps*, 1896, *Mr Punch's Animal Land*, 1898, *Mr Punch's Book of Arms*, 1899, and *The Tablets of Azzit-Tigleth Miphansit the Scribe*, 1900.

Reed, Herbert Langford (1889-1954), humorous writer, b. Clapham. In 1910 he joined the staff of the *Daily Mail*. A collector and writer of limericks and nonsense verse, he pub. *The Complete Limerick Book*, 1924, *The Anthology of Nonsense Verse*, 1926, *Sausages and Sundials*, 1927, *The Indiscreet Limerick Book*, 1928, *The New Limerick Book*, 1937, and *The Nondamsense Ballads*, 1937. He also wrote a life of Lewis Carroll, 1932.

Reed, John (1887-1920), Amer. journalist b. Portland, Oregon, U.S.A., of wealthy parents. Educ. at Harvard and travelled in Europe. He worked for the *American Magazine* and *The Masses*,

and covered the Mexican revolt of 1914 for the *New York World*, accompanying 'Pancho' Villa (see VILLA, FRANCISCO), and wrote his impressions of Villa and others in *Insurgent Mexico*, 1914. In the First World War he was on the E. European front and was in Russia during the Oct. Revolution, becoming associated with Lenin. His first-hand description of the Russian Revolution was contained in *Red Russia*, 1919. Driven out of the National Socialist Convention (U.S.A.) in the same year, he organised the Communist Labor party and founded and ed. its organ, the *Voice of Labor*. Being indicted for sedition, he took refuge in Russia, where he joined the Communist leaders. He d. of typhus and was buried in the Kremlin. His most important work was *Ten Days that Shook the World*, 1919 a graphic account of the revolution to which Lenin wrote an introduction for a later ed. Other pubs.: 'Sangar' (in *Poetry*), 1912, *The Day in Bohemia*, 1913, *The War in Eastern Europe* (with Boardman Robinson, 1916). See life by Granville Hicks, 1936.

Reed, Talbot Baines, see CHILDREN'S BOOKS.

Reed, Thomas Brackett (1839-1902), Amer. politician and lawyer, b. Portland, Maine. He was called to the Bar about 1866, and became attorney-general in 1870. After holding other high offices, he was elected a member of Congress in 1876, and during the years 1889-91 and 1895-9 occupied the position of Speaker in Congress, resigning soon after the last date. For his partisan decisions he was known by the Democrats as 'Czar R.' In 1890 he brought about the adoption of the 'Reed Rules,' which greatly revised and simplified the procedures of the House.

Reed, Walter (1851-1902), Amer. army surgeon, b. Harrisonburg, Virginia. He graduated in medicine at the univ. of Virginia at the age of 19, and in 1875 was commissioned in the U.S. Army. During the Sp.-Amer. War of 1898 he was sent to study the outbreaks of typhoid in the army camps and demonstrated that flies were the chief cause. In 1900 he was in charge of an investigation of yellow fever among the Amer. troops in Cuba and gave the first definite proof that the disease is transmitted by mosquitoes. During his investigation R. himself submitted to inoculation and came through an attack of yellow fever. His discovery made possible the work of W. C. Gorgas (q.v.). See life by H. A. Kelly, 1913.

Reed, name of various tall aquatic plants. The common R. (*Phragmites communis*) is a tall plant, with long leaves or grass, a dense, drooping, purple-brown panicle of spikelets, and a perennial root. It is found in swamps and shallow water, except poor and acid soils, throughout the world except some tropical regions, yielding an abundance of stout, durable grass of great value for thatching, while its long creeping rootstock binds muddy river banks. The plant is remarkable in that its ash contains over 70 per cent of silica.

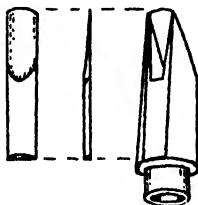
Arundo donax is a R.-grass of S. Europe, grown in S. England. *Glyceria maxima* is a R.-grass of Britain. *Cyperus papyrus* is the Paper R.

Reed Bird, see BOBOLINK.

Reed Warbler, see WARBLERS.

Reedbuck, see ANTELOPE.

Reeds: 1. The vibrating tongues producing the tone of certain woodwind instruments (except, for example, flutes) and of organ pipes, though in the latter case they are often made of other materials than reed. These instruments use so-called 'beating R.,' and these are single for clarinets, saxophones, and organ pipes and double for oboes, bassoons, and bagpipes. There are also 'free R.,' used in harmoniums and instruments of the concertina and mouth-organ type.



REEDS

Above, two views of clarinet reeds and a clarinet mouthpiece; below, bassoon, oboe, and bagpipe.

2. In weaving, frames of parallel flat strips of wood for separating the warp threads.

Reefing, operation of reducing the area which the sail of a ship presents to the wind. From the head of a sail to the first reef-band, a piece of canvas sowed across a sail to strengthen it in the part where the eyelet-holes come, is called the first reef; from the first to the second reef-band is the second reef, and so on. Courses and top-sails are made reducible, the former generally having 2, the latter 4 reefs. They are fitted with spilling, slat, and reef-lines and becket, and toggles on the yard. Reef-points or reef-lines are flat pieces of cordage tapering towards each end, and passed through the holes in the reef-band of a sail, a knot being then made on each side. Patent R. gear is sometimes used,

which allows as much as possible of the operation of R. to be done from the deck.

Reel, Scottish, Irish, and Scandinavian dance, of either Celtic or Scandinavian origin. It is performed with the dancers standing face to face and the music is in quick 2-4 or 4-4, occasionally 6-8, time and divided into regular 8-bar phrases. A musical characteristic of many R.s is a drop into the triad of the subdominant unprepared by modulation.

Reeling, see COTTON.

Reeve, Henry (1813-95), Eng. man of letters and editor, b. Norwich, son of a physician. He was educ. at Norwich school and at Geneva. From 1840 to 1855 he was on the staff of *The Times*, the foreign policy of which he influenced throughout those years. He was the medium of private negotiations between the Eng. and Fr. Govts., and successive Fr. ambas. in London relied on him for guidance. He was editor of the *Edinburgh Review* from 1855 to 1895, in succession to Sir George Cornewall Lewis (q.v.), and of the *Greville Memoirs*, 1865. He trans. De Tocqueville's *Democracy in America*, 1835-40, and Guizot's *Washington*, 1840, and wrote *Royal and Republican France*, a collection of admirable essays on eminent Frenchmen (2 vols., 1872). See life by Sir J. K. Laughton, 1898.

Reeve, see RUFF.

Reeve (O.E. *gerefa*), Eng. official who in early times was the chief magistrate of a tn or dist., with the administration of which he was entrusted. There were many kinds of R.s, as the port R., the tn R., the high R., the manor R., the shire R. ('sheriff'), etc. The word is now used in Canada for the president of a tn council. See also LOCAL GOVERNMENT; SHERIFF.

Reeves, John Sims (1818-1900), tenor, b. Woolwich, his father being a musician in the Royal Artillery. When he was 14 R. was organist of N. Cray church, and could play several other instruments. In 1839, after studying medicine for a year, he appeared as a baritone at New-castle. After studying at Paris under Bordogni and at Milan under Mazzucato, he returned to London in 1847, and was henceforth recognised as the leading Eng. tenor. He ceased to sing on the stage after 1860, but appeared on the concert platform until shortly before his death. In oratorios R. was especially good, and he sang regularly at musical festivals.

Referendum. In politics a direct appeal by the gov. to the electorate on a single definite issue. Brit. political opinion is as much against the idea of a R. as it is against that of the initiative, the general theory of Eng. democracy or the principle of representation is that the parl. representatives are chosen not so much upon any definite issue or issues as upon a general policy the execution of which is left to the representatives themselves (see INITIATIVE). Lord Balfour of Burleigh introduced a Bill into the House of Lords in 1911 for establishing the R. This was merely a belated effort at reform of the

House of Lords made in the vain hope of defeating the Parliament Act, 1911.

The general principle of the R. as it is understood in many of the states of the U.S.A. is that no law or measure save those whose urgency is required by public safety, and which, as a rule, require a two-thirds or three-fourths majority, shall go into effect for a fixed period, during which people can have an opportunity of objecting to it. Different states have differing rules. There is, however, no provision for the R. in the Federal constitution of the U.S.A. In Switzerland the R. applies only to legislation affecting the constitution which has already passed the Federal Assembly by a specified majority.

Canada has used the R. particularly on the question of the liquor laws. Australia has used the R. on sev. occasions to introduce amendments to the constitution, and proposed laws for altering the constitution must be submitted to the electors and can be enacted only if approved by a majority of the states and by a majority of all the electors voting. See HOUSE OF LORDS.

Reflection and Refraction of Light. In travelling through space or any homogeneous medium waves of light follow a straight path; on reaching another medium, part of the energy is reflected at the surface. The transmitted light is partly absorbed in the new medium, and at the exit boundary the remainder is partly reflected and partly transmitted. There are two simple laws of reflection. The first states that the incident and reflected ray are in the same plane with the normal or vertical line at the point of reflection. This can be proved by a simple experiment as in Fig. 1, where

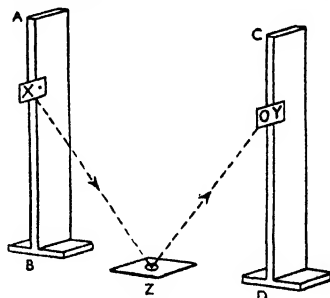


FIG. 1

the reflection of X in the mirror Z is viewed through a small hole in Y. Further, on altering the position of the mirror and adjusting Y so that the image of X appears through the hole, it will be found that XB/XZ is always equal to YD/YZ ; i.e. the angle of incidence equals the angle of reflection. These two laws being entirely mathematical, the study of reflection becomes a branch of geometrical optics. Fig. 2 illustrates a simple development. N is the normal

to the mirror MR, and an object at N will be reflected back upon itself; if now the mirror be rotated on P into the new position M₁R₁, the normal will be nP, and the reflection of N will appear at N₁; that is, the reflected ray rotates at twice the speed of the mirror. The phenomenon of refraction is readily observed by immersing a stick in water, as shown in Fig. 3, when the eye is placed in the same plane as the stick. By arranging an experiment

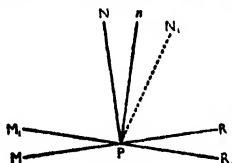


FIG. 2

as shown in Fig. 4, where a strong beam of light is totally internally reflected by the prism P on to the milky water in the tank, and marking the angle of incidence and the angle of refraction (i.e. the angles made by the 2 bent portions of the beam with the normal) it can be shown that whatever the angle of the incident beam, its sine always bears a constant ratio to the sine of its angle of refraction. Denoting this ratio by its usual symbol μ , then $\mu = \sin \phi / \sin \theta$, and this is the index of refraction from the first to the second

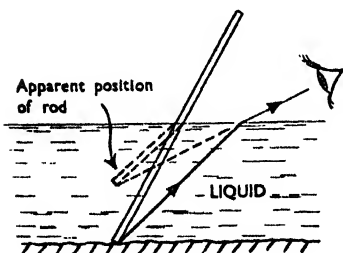


FIG. 3

medium; for air and glass, $\mu = 3/2$ (approx.); for air and water, $4/3$. For a vacuum to air boundary $\mu = 1.00029$. This law (Snell's law), together with the law that the path of the refracted beam and the normal are in the same plane, again gives the mathematical basis for further study. In Fig. 4 the angle of deviation of the light is $(\phi - \theta)$. If in the same figure the light originated in the water at L, it would traverse the same path, but in the opposite direction; then, light travelling from an optically less dense to a denser medium is bent towards the normal; from dense to less dense, away from the normal. In this

latter case there is an important consequence. The mirror M in Fig. 4 may be moved to reflect the light falling on it; as the beam emerges from the water it is bent towards the left (beam A). As now the beam is reflected more and more to the left in the water, the emergent beam (B) will fall closer and closer towards the surface. A point is reached when it coincides with the surface. Beyond this refraction ceases and total internal reflection takes place, as shown in the figure (beam C), i.e., the beam remains in the water and obeys the law of reflection. This is readily observed by holding a glass of water above the eye, when the upper surface appears as a mirror. The angle of incidence at the moment when the emergent ray disappears is known as the critical angle; it is easily calculated to be $\sin^{-1}(1/\mu)$. For water to air it is $48^\circ 45'$. Newton discovered that the refractive index of a substance varies for the different coloured constituents of white light, i.e. depends on the wavelength (see DISPERSION; SPECTRUM).

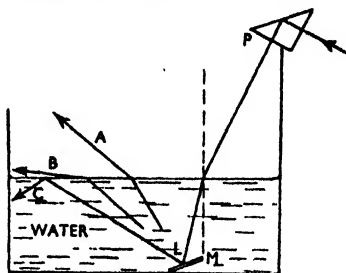


FIG. 4

Double Refraction. An object viewed through a suitably oriented crystal of Iceland spar appears double. This is due to a second refraction ray, called the extraordinary ray (see POLARISATION).

The phenomena of reflection and refraction give rise to the mirage, rainbow, haloes, etc. Refraction is of great importance in astronomy, since the rays from heavenly bodies are refracted on entering the atmosphere. The twinkling of stars is due to refraction varying with the varying density of the air traversed by the ray. See T. Preston, *Theory of Light*, 1895, 1928; R. A. Houstoun, *A Treatise on Light*, 1938; W. H. Bragg, *Universe of Light*, 1933; R. W. Ditchburn, *Light*, 1952; F. A. Jenkins and H. E. White, *Fundamentals of Optics*, 1950; R. W. Stewart and J. Satterly, *Textbook of Light*, 1947.

For refraction, in vision, see REFRACTION, ERRORS OF. See also DOUBLE REFRACTION; POLARISATION; PHYSICAL CONSTANTS.

Reflex, in medicine and physiology, an involuntary action due to nerve stimulus.

Muscular movements may be divided into voluntary and involuntary. Voluntary movements involve a certain degree of consciousness, not only as regards perception of the movements, but also with respect to their origin. The stimulus which evokes a voluntary movement may be a sensation carried to the brain by a peripheral nerve, but the brain process involves a reaction between the new perception and perceptions already existent in consciousness, so that the resulting movement corresponds in only a modified manner with the external stimulus. Involuntary movements, on the other hand, bear a certain definite relation to the stimuli which evoke them; if the same stimulus be repeated, the same movement will follow, unless other nervous forces interfere to modify or inhibit that movement. It may be said, however, that many movements which are usually reflex may come under the dominion of the will if attention be attracted towards them. Breathing, for instance, is usually reflex, and the muscles associated with that function adapt themselves to any variation required by altered conditions without disturbing consciousness, but if the conditions are particularly unusual, or if the trend of thought leads to the subject of breathing, the muscular movements may be consciously directed. The part of the central nervous system associated with voluntary action is the brain, while reflexes constitute the special function of the spinal cord. A reflex is a reaction which is started by a stimulus acting on some nerve; the stimulus is conveyed by afferent nerves to the spinal cord, where it links up with an efferent nerve, and thence an impulse starts towards appropriate muscles. This is known as the reflex path. The spinal cord therefore functions as an exchange, by which certain stimuli are made effective in near or distant quarters. Many reflexes are very complex and have been highly differentiated in the striving of the organism after economy of effort; the higher the degree of differentiation, the greater is the possibility of the reflex being disturbed by cross reflexes or voluntary control. Some reflexes, particularly where nerves are tapped, as in tapping the patella to obtain the knee-jerk reflex, on their way to the central system, are peculiarly invariable, at any rate in ordinary health. The absence or modification of such a reflex is therefore often an important indication of a morbid condition otherwise difficult to diagnose. The knee-jerk, for instance, is absent in locomotor ataxia, destructive lesions of the lower part of the spinal cord, diabetes, infantile paralysis, etc. It is increased in tumours of the brain, cerebrospinal sclerosis, after epileptic seizures, etc. A reflex clonic (see CLONUS) contraction of the calf muscles is obtained by sudden flexion of the foot by pressing the hand against the sole. It is rarely manifest in perfect health, and indicates some degree of spinal disturbance. Wrist-clonus is

obtained by pressing the hand backward to extreme extension; it is observable in hemiplegia. There are many other reflexes not of a clonic or rhythmic character which occur or disappear in certain diseased conditions, particularly those associated with the spinal cord. The specific character of a clonic as distinguished from other reflexes lies in its rhythmic or periodic quality. Rhythm is, of course, present in such reflexes as breathing, walking, and the beating of the heart, but such processes are fairly complex. Rapid rhythmic movements, such as the scratching of its hide by a dog, can be produced even when voluntary action is rendered impossible by removal of part of the brain. If the skin of the shoulder be irritated the stimulus is conveyed to the spinal cord, and the afferent nerves carry alternate impulses to the flexor and extensor muscles of the hind leg, so that an almost perfect rhythm of about 4 beats to the second can be produced. It is obvious that in such a movement the contraction of the flexor muscles must be followed by a pause, after which the extensor muscles reverse the movement of the limb. These movements appear to resist fatigue for a long time.

Reflex Action, see NERVOUS SYSTEM.

Reform Club, founded in 1836 and formerly the H.Q. of the Liberal party. Cobden, Bright, Gladstone, Asquith, and Lloyd-George, and all the notable Whigs or Liberals (see PARTY GOVERNMENT) were members in their day. The club premises at 104 Pall Mall were designed by Barry, and constitute the finest clubhouse in London. The club has a fine library and an incomparable collection of political works. Since the decline in the fortunes of the Liberal party the R. C. no longer enjoys its former political prestige, though it is still frequented by Liberal members of Parliament, and by professional men, particularly journalists, lawyers, and economists. See CLUBS.

Reform of the House of Lords. For many years there has been a conflict of opinion whether the House of Lords constituted on the hereditary principle is the right kind of body to exercise a veto on legislation agreed by a majority in the elected House of Commons. More than 800 peers are entitled to sit and vote. The majority enjoy that right by succession, but many have little or no interest in public affairs, nor any desire to sit in the House, yet under the existing order they have no option but to be members. Attendances have declined, its powers have been reduced, and a feeling has been expressed that unless something was done to bring new life to it, the House would cease to exist as an effective element of the constitution.

In Jan. 1956 a select committee which had been set up 9 months earlier to consider the powers of the House in relation to attendance reported that there was no power to limit or qualify the right of a peer, who was of age and not subject to

legal disqualification, to receive a writ of summons, the receipt of which entailed the duty of attendance. Nor, the committee thought, would it be proper for the House, by refined definition of the words used in letters patent or writs, to limit the voting rights of peers. Pointing out that it had been the practice of the House in the past to make frequent orders for the attendance of all peers who had not been excused, to enter the names of those excused on the *Journals*, and to punish the failure to obey orders for attendance by reprimand, fine, or imprisonment, the committee stated that there was no general power to exclude peers who had received a writ of summons, but leave of absence could be given to peers who were unable to attend. Standing orders could be framed to meet this contingency.

One of the reasons advanced for the decline in attendance has been the gradual whittling away of the powers of the House, which has removed much of the attraction the House might otherwise have had for peers. An even more forceful reason is the economic one. The belief that peers are very rich men with much time on their hands has long since been exploded. Most can no longer afford to give their entire time to a job for which they receive neither remuneration nor expenses. A scheme for the payment of a daily attendance expenses allowance similar to that paid to members of the Commons has been considered, but its introduction awaits more propitious times.

Numerous attempts have been made to create a strong and effective Second Chamber since the Reform Act, 1832. While many of those proposals have aimed at substituting a popularly elected Second Chamber with limited and defined powers for the hereditary House, the only legislative action has resulted in a curtailing of the veto on money and non-money Bills. So far, no Gov. has been able to discover a suitable instrument for achieving what is generally accepted to be the aim. Moreover, there is considerable conflict about which element of reform should be introduced first, composition or powers. Some people want a revision of powers to precede any change in composition: others desire the reverse. Another group contend that these elements are complementary, and should therefore proceed together rather than separately. Until that conflict is resolved, reform of the Upper House remains a matter of academic discussion rather than a practical or political reality.

The continuation of the hereditary principle without limitation as the basis of composition has not been contemplated by the many schemes put forward in the last 100 years. Most reformers have considered that a House with 350 or 400 members would be ideally suited for the functions it is considered they should perform. A proportion of that number would be selected from the hereditary peers, but there would also be life peers

and Lords of Parliament in addition to the Law Lords and members of the Episcopal bench.

The right of the Crown to create life peerages has been almost undisputed, and although there had been no such creation for more than 400 years, an opportunity to use this method of varying the composition of the House was lost in 1856, when the committee for privileges denied Queen Victoria the right to exercise her prerogative to create Sir James Parke as Baron Wensleydale. An opportunity to reverse that decision occurred 32 years later, when the Marquess of Salisbury introduced 2 Bills, one of which would have permitted the creation of life peers and the other would have discontinued the issue of a writ of summons to those peers who did not normally take their seats.

Hostility in the Commons prevented further action being taken about these 2 measures, the principles of which had been accepted by the Lords. In 1953 Viscount Simon, a former Lord Chancellor, introduced another Bill, which would have permitted the Queen to create up to 10 life peers a year. One interesting feature of his proposals was that such creations could include women. The Bill was postponed to await an all-party conference to consider the question of reform, and was not revived when the Labour party's refusal to enter such a conference brought the matter to naught.

Tactical skirmishings about the rights and powers of the Lords continued throughout the latter half of the 19th cent., and became acute at the beginning of the 20th with the growing impetus of radical and then socialist legislation. With the return in 1906 of the Liberal Gov., able to command a majority of 360 and prepared to enact an unprecedented programme of social legislation, there developed a violent and acrimonious parl. battle, involving 2 monarchs, and ending with firmer pledges than ever for a reformed House of Lords. That year Lord Lansdowne, leader of the Conservative peers, defined the duties of the Upper House as to arrest the progress of measures which they believed had been insufficiently considered, or were not in accord with the deliberate judgment of the country. When the Lords, acting on this somewhat provocative claim, exercised their rights within a few months of the general election to reject Licensing and plural voting Bills, and so amended the Education Bill that it had to be dropped because no effective compromise could be found by negotiation, the Gov. made a declaration of right. They asserted, and the Commons agreed, that to give effect to the will of the people as expressed by their elected representatives, 'it is necessary that the power of the House [of Lords] to alter or reject Bills passed by this House should be so restricted by law to secure that within the limit of a single Parliament the final decision of the Commons shall prevail.'

The Lords, under no illusions about the need of reform from within to prevent it being imposed from without, actively sought a formula to that end. Lord Newton introduced a Bill in May 1907, in which certain basic principles for an elective Second Chamber were set out. That measure was withdrawn in favour of a select committee presided over by the Earl of Rosebery, which in a report the following year suggested a House of 400 members. Recommending that an hereditary peerage should no longer give right to a writ of summons, but that the right might be conferred on such peers who were qualified by tenure of high office of state or long service in the Commons, they urged that the Crown should be able to nominate 40 life peers, and that the number of hereditary peers to be chosen from among their own number should be 200.

The Gov. were concerned less with composition and more with powers. They considered that nothing could be done about the former until the threat to their legislation had been removed. The conflict erupted into full fury when the Lords declined to give a second reading to the Finance Bill of 1909, on the ground that it embodied principles of taxation so novel in character that the express approval of the electors was required before it could become law.

There had never been any denial of the technical right of the Lords to reject a money Bill, although there had been a formal denial of the power to amend or alter such Bills since 1671. After their opposition to the repeal of the paper duties in 1860, all money Bills had been combined in a single Budget; piecemeal rejection of individual Bills was impossible, the Budget had to be wholly accepted or rejected. For the Lords to claim in 1909 that they were better able to judge the popular will of the people in financial matters was a challenge to the Lower House which could not be overlooked.

Parliament was dissolved, and the general election of Jan. 1910 left the 2 main parties almost equal in numbers, but with the Gov., supported by the Nationalists and Socialists, able to command a majority of about 120. The Finance Bill became law, and the Gov. immediately turned their attention to checking the powers of the Lords. They introduced resolutions, which were subsequently incorporated in the Parliament Bill, which defined money Bills, made the Speaker's certificate about them final, and provided that if such Bills were not passed unamended within 1 month of their being received by the Lords they would receive the royal assent immediately and without the assent of the Upper House. They also laid down that any other Bills, if passed in the same form by the Commons in 3 successive sessions, should receive the royal assent, even if rejected by the Lords, provided that not less than 3 years had elapsed between the time of the first second reading and the

last third reading in the Commons. Finally, the duration of a Parliament would be reduced from 7 to 5 years. A conference of party leaders from Feb. to Nov. 1910 failed to reach agreement on the constitutional issues involved. The Cabinet advised dissolution, and the Gov., still with Nationalist and Socialist backing, maintained their majority.

The Parliament Bill passed the Commons. When it came before the Lords there was a rearguard action against bringing it into law. Lord Lansdowne began this by presenting a scheme for ending the deadlock between both Houses. This would have involved a joint sitting of the 2 Houses to resolve differences on Bills other than money Bills, and an offer to forgo the right to reject or amend money Bills that were purely financial, provided that there was an effectual provision against 'tacking' (the addition of other provisions to secure the benefit of this procedure), and that any question arising from them could be referred to a joint committee of both Houses, with the Speaker as chairman. The Gov. were in no mood to be deflected. With one small exception they rejected the amendments which the Lords made to the Parliament Bill. The deadlock was absolute, and a further appeal to the nation out of the question. Mr Asquith then announced the King's intention to carry out his promise to exercise the prerogative of creating peers in sufficient numbers to ensure the passing of the Bill without amendments. The Lords yielded, and the Bill became law.

While it was being debated Lord Lansdowne, still seeking a way out of the impasse and striving to retain for the Lords the powers that were slipping away, introduced a reconstitution Bill. This would have disqualified about 400 peers from membership, leaving the House with a strength of 350. There would be 320 Lords of Parliament: 100 chosen by hereditary peers, 120 by electoral colleges, for which an elaborate machinery was proposed, and 100 nominated by the Crown. There was a list of qualifications for hereditary peers, and peers nominated by the Crown would be in proportion to the strength of the parties. Lords of Parliament would sit for 12 years, one-fourth in each category retiring each third year.

By the preamble to the Parliament Act the Gov. were pledged to reform of the Lords. But nothing was done before the outbreak of war in 1914, and obviously nothing could be done during the War. In 1917 the Bryce committee, after considering the question, advocated a House of about 350 members, 246 of whom would be elected by the Commons voting in 13 areas and another 81 by a joint committee of both Houses. There was also a scheme for settling differences between the Houses about Bills, and the principle of 12-year peers was included. It is clear that the Commons would never agree to the creation of a House on an elective basis which could be a rival to

themselves. Yet successive Govs. have reaffirmed their faith in reform. In 1922 and 1927 the general principles on which the Gov. of the day wished to act were restated. In each case a House of 350 members was proposed on an elective basis, similar to that outlined by the Lansdowne and Bryce schemes, with the power of certifying a money Bill transferred from the Speaker to a committee of both Houses. Hostility from the Opposition prevented any move being made, and a similar fate befell attempts by the Earl of Clarendon in 1928 and the Marquess of Salisbury in 1933.

It was always realised that the powers of the House might become a constitutional issue again, but they did not until 1949, when the Labour Gov., faced with the problem of getting their legislation through during their term of office, and under the 2 years' delay procedure, sought to reduce the period to 1 year. An all-party conference to discuss the devising of an agreed plan of reform broke down on the question of the powers of veto, although the difference between the parties was narrowed to 3 months. The Gov. wanted 9 months from the third reading in the Commons, the Conservative opposition insisting on 12 months. The Labour Gov. then passed their Bill using the procedure of the 1911 Act.

A change of Gov. in 1951 brought the question to the fore again, particularly as reference had been made to it in election appeals. The subject appeared in election manifestos after that time, and in 1955 the Conservative Gov. said they were continuing to labour to perfect the details of a scheme for reform. Suggestions for reform put forward by the Conservatives in 1957 included creation of life peers and admission of women to the House. *See also* HOUSE OF LORDS; PARLIAMENT.

Reformation, name given to the revolution which took place in the W. Church in the 16th cent., by which a great part of N. Europe rejected in whole or in part the system and teaching of the Rom. Catholic Church and the authority of the Pope.

Causes. The medieval polity was essentially centralising. The see of Rome claimed by divine right and asserted throughout Europe an absolute authority over the Church, though the exercise of this power in the temporal sphere, especially in matters of papal taxation, was resisted by various princes. Also, since the clergy were the educ. class of the Middle Ages, and since under feudalism they had been entrusted with the gov. of large areas in every country, it was inevitable that a preoccupation with secular affairs and a consequent worldly spirit should arise amongst them. To worldliness must be added 2 abuses of administration: that by which many benefices and livings might be accumulated in the hands of one man (though this continued to be an abuse after the R. in Protestant countries), and that by which youths and even children were

raised to high office in the Church. The laxity in the lives of many of the clergy and prelates, a laxity which was increased by the Renaissance movement, did not cease after the R. But at the time it led to popular disgust, and made the cause of the reformers have a wider appeal than it might otherwise have had.

The Renaissance contributed substantially to the R. It was the outburst of an individualism such as had not been seen for cents., and caused a growth of national consciousness in varying degrees throughout Europe. The critical Renaissance attitude, coupled with the general spirit of anti-clericalism, led to a questioning of the doctrinal bases on which the unpopular vested interest of the clergy ultimately rested. So Luther's protest, from being at first a voicing of the feeling against clerical rapacity, as exemplified by the preaching of the indulgence of 1517, passed quickly to an attack on the doctrine of indulgences, and thence to a general attack on the doctrinal system of the Church. Finally, the greed of laymen played a large part in the general overthrow of the Catholic system in N. Europe, especially in England and Scandinavia. The chance of enriching themselves at the expense of the Church tempted kings and nobles to throw in their lot with the reformers, and thus to supply that governmental support without which the movement might well not have succeeded.

The Objects and Teaching of the Reformers. As a general rule, the R. succeeded in those countries where the civil gov. and the reformers acted in combination. The main object of both was the overthrow of the papal supremacy and the curtailment of clerical privileges. But whereas civil govts. promoted this policy for their own aggrandisement, the reformers proper were actuated by religious zeal. In the literature issued by the reformers we find this point strongly emphasised: that the main body of the Church had fallen away from the primitive truth and the primitive discipline, that already appeals had been going up too long for a general council to reform the manifold abuses, and that it was therefore necessary for all those who could to set about the task of R. immediately. The appeal of the reformers, especially in England, was to the Bible and the Fathers. They disclaimed any desire to introduce new doctrines, and charged the Catholics with the introduction of novelties.

The Reformation in Germany. It was a practical abuse that impelled Martin Luther (q.v.) to the act which is generally considered the official beginning of the R. On 31 Oct. 1517 he nailed to the doors of the castle church of Wittenberg his famous theses in which he attacked the doctrine of indulgences. The move to doctrinal reform was rapid; and in 1519, in his disputation with Eck, one of the ablest of the Catholic champions of that age, he questioned the supremacy of the Pope and the doctrines of purgatory, auricular confession, and priestly absolu-

tion. In June 1520 Pope Leo X issued a bull condemning as heretical 41 propositions extracted from Luther's writings. Luther appealed from the Pope to a general council, and publicly burnt the bull in Dec. In Jan. of the next year (1521) he was excommunicated. Three months later he appeared before the Diet of Worms to defend his opinions, and here he maintained that both Popes and councils may err. He refused to retract his teachings, and placed himself under the protection of Frederick of Saxony, who steadily upheld the cause of the reformers. On his death in 1525 his successor, John, openly embraced the R., and during the next 4 years, with the assistance of Melancthon in Saxony and Bucer at Strasburg, Luther's opinions spread rapidly throughout the Ger. states and as far as Sweden. This rapid diffusion of the R. in Germany was helped, however, not only by the popular feeling, but also by the self-interest of the various princes, who eagerly seized upon the wealth of the suppressed convents, collegiate churches, and other eccles. estab. In 1529, at the Diet of Speyer, the Rom. Catholic princes were in the majority and proscribed many of the reformers' chief tenets. It was from the protest which the other princes and their adherents then made that the name Protestant (q.v.) is derived. Following on this protest an unsuccessful attempt was made to reconcile the Lutherans and Zwinglians (see below). In 1531 the Confession of Augsburg was pub., giving the doctrine of the reformers. Meanwhile the emperor had issued an edict forbidding any further action by the reformers until a general council should have been called. Alarmed at his action, the Protestant princes assembled at Schmalkald, with the elector of Saxony at their head to form a religious and political defence league. War followed, and in 1546, through the defection of Maurice of Saxony, the Schmalkaldic League was utterly defeated. In 1555, after prolonged negotiations, a diet met at Augsburg to settle the religious condition of the Ger. states, and it was decided that each prince should choose his side, that the people should follow him in religion (*cuius regio, eius religio*), and that there should be no attempt at compulsory conversion on either side. The peace thus made was broken in 1619 by the Thirty Years War, terminated in 1648 by the peace of Westphalia, which in practice estab. a more tolerant arrangement, though still based on compulsory religious conformity within each state and religious equality between the states.

In Switzerland. While Luther had been working in Germany, a parallel movement had been progressing in Switzerland under the leadership of Ulrich Zwingli (q.v.). Here again the proximate cause of the outburst was the doctrine of indulgences, and here again political events regulated the course of the R. In 1531 Zwingli was killed. Henceforward the centre of reform moves from Zürich to Geneva,

and the hist. of the movement gathers round the name of Jean Calvin (for the further progress of the R. in Switzerland see CALVIN). But the influence of this great Fr. reformer did not stop here. His system of church polity formed the model for the Presbyterian and Congregational systems, and the influence of his theological teaching spread as widely as the R. itself. His influence was especially great in France, Holland, Scotland, and England.

In the Northern Kingdoms, Denmark, Norway, and Sweden. In all these 3 countries the Lutheran form of the reformed religion spread rapidly, and in each case the action was initiated by the sovereign. In Sweden the Lutheran doctrines were accepted by Olaus Petri and Archdeacon Andersen. The movement was taken up by Gustavus Vasa (q.v.), who found in it a powerful tool for the furtherance of his own projects. In 1527, at a council held at Westerås, the reformed doctrines were unanimously adopted. The work of it was completed by the Synod of Örebro (1529); though externally the change in Sweden and Denmark was less at first than in the other countries, most of the externals of Catholic worship being retained. The new teachings were introduced into Denmark, then united to Norway, by Christian II about 1520, and after his deposition in 1523 the work was carried on by his successor, Frederick. He granted religious liberty to the reformers at the Diet of Odensee in 1527, and in 1546, at the Diet of Copenhagen, the new doctrines were finally imposed on the country. Their introduction into Norway was due to Christian III, and here again many of the externals of Catholic worship were retained.

In France. Here the new doctrine made less general progress, being embraced almost exclusively by the aristocracy and the intelligentsia. They had found their way into France as early as 1530 from Germany and Switzerland. There was a tradition of religious dissidence among the mts of Dauphiné, bordering on the Waldenses. Pierre Robert d'Olivet, Michel Cop, rector of the univ. of Paris, Beza, and others adopted and spread this, and Margaret of Navarre, sister of Francis I, gave them her countenance. But Francis I opposed them. For the persecutions and the civil and religious wars, see FRANCE, *History*. At last Henry IV by the Edict of Nantes (1598) acknowledged the reformed faith as the lawful creed of a part of the Fr. pop., the Huguenots (q.v.).

In the Netherlands. The doctrines of the R. had made many converts in the Netherlands during Luther's lifetime, and a fresh influx of Calvinists from France and Switzerland increased the number of dissidents from the Rom. Church. The reformers suffered persecution under Charles V of Spain and his successor, Philip. But the revolt of the Low Countries ended in the N. states adopting Calvinism. The Netherlandish Con-

fession of Faith was pub. in 1562, and was later revised and repub. at the Synod of Dort in 1618. At the present day about 50 per cent of the Dutch are Protestant.

In East-Central Europe. Under Sigismund Augustus, the Lutherans and Calvinists became very numerous in Poland, and many of the nobility embraced the reformed doctrines. For a little while it seemed that Poland might become permanently Protestant; but under Sigismund II and his successors it was won back to Catholicism by the forces of the Counter-Reformation (q.v.), and only a small minority of Protestants exist in Poland to-day. Long before the R. proper the Hussite movement (see HUSS, JOHN) had swept Bohemia; and here the R. gained many immediate supporters, though the majority of the pop. were won back to Catholicism after the Thirty Years War (q.v.). In Hungary Calvinism had many supporters among the nobility, and a fairly large minority of Hungarians remain Protestant to-day.

In England and Scotland. Though the annulment of Henry VIII's (q.v.) marriage with Catherine of Aragon has been described rather as the occasion than the cause of the break with Rome, the episode is important because it enlisted the Crown on the anti-papal side; and without governmental support it is very doubtful if the R. would have succeeded in England, for the country was considered generally staunchly Catholic, and the active reformers did not constitute more than a tiny minority of the pop. until after the R. was firmly estab. Though Henry claimed for himself the headship of the Church, he had no sympathy with the reformed doctrines, and his Act of Six Articles brought many of the reformers to the stake as heretics at the very time when Catholics were dying in support of the principle of the papal supremacy. Under Edward VI the gov. allied itself with the extreme Protestant minority, and drastic changes were seen. The reign of Mary saw a temporary return to the Rom. obedience, but on the accession of her sister Elizabeth I (q.v.) in 1558 the R. was resumed on lines which represented a compromise between Henry VIII's and Edward VI's ideas of Protestantism. The mass of the clergy conformed, the Catholic gentry were crippled by fines, and during the reign some 180 Catholics, mostly priests, were executed. Protestantism, though not always of the type approved by the State, gradually permeated the Eng. people, though in Ireland the S. cos. remained fervently Catholic in spite of persecution. In Scotland the name of John Knox stands out above all the rest, though here too impetus was given to the movement by political causes (for a further account of the progress of the R. in this country see KNOX, JOHN).

Effects of the Reformation. Any interpretation of the effects of the R. is coloured by religious prepossessions. A Catholic regards the R. as disastrous because it broke up the unity of Christen-

dom. A Protestant regards it as the birth of freedom of thought, the inauguration of a purer religion, and the point of departure for all modern progress. A neutral observer might point out to the Catholics that the R. reacted beneficially on the Catholic Church by giving impetus to the movement which culminated in the doctrinal clarification and disciplinary spring-cleaning of the Council of Trent. The struggle against the R. led to a great reform of clerical life in the Catholic Church, to the foundation of seminaries, schools and religious orders (notably of the Society of Jesus—the Jesuits, q.v.), and great missionary enterprises both in Europe and all over the world; in other words, to what is known as the Counter-Reformation (q.v.). On the other hand, the number of rival sects into which Protestantism has split has led in our own day to a desire among many of the reformed churches for religious reunion.

See M. Creighton, *History of the Papacy During the Period of the Reformation, 1882-94*; L. Paslow, *History of the Popes from the Close of the Middle Ages* (Eng. trans.), 1891-1912; G. Mentz, *Handschriften der Reformationszeit, in Tabulae in usum Scholarum* (ed. by J. Lietzmann), 1910; G. Wolf, *Quellenkunde der deutschen Reformationsgeschichte* (3 vols.), 1915-23; P. Smith, *Age of the Reformation*, 1920; H. S. Lucas, *The Renaissance and the Reformation*, 1934; E. C. Messenger, *The Reformation, the Mass, and the Priesthood: a Documented History with special Reference to the Question of Anglican Orders* (vol. I, *The Revolt from the Medieval Church*, 1936; vol. II, *Rome and the Revolted Church*, 1937); J. Mackinnon, *The Origins of the Reformation*, 1939; and Sir F. M. Powicke, *The Reformation in England*, 1941.

Reformatory and Industrial Schools, see APPROVED SCHOOLS.

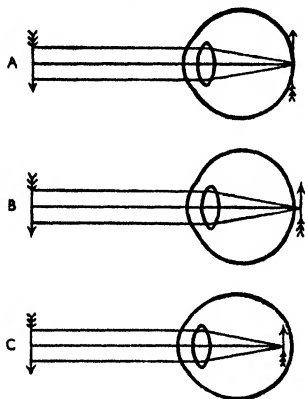
Reformed Churches, the religious societies which followed the teaching and eccles. organisation of Calvin and Zwingli rather than those of Luther. In Germany the Reformed and Lutheran churches co-exist. Of the other Protestant churches, those of Scotland, Holland, France, Poland, Switzerland, and most of those in America belong to the former group. The R. C. differ from the Lutheran in their total rejection of consubstantiation, in regarding the Lord's Supper as only a commemorative meal, and in rejecting ceremonial and ornaments retained by the Lutherans, such as the crucifix. They have generally a Presbyterian organisation.

Reformed Presbyterians, see CAMERONIANS.

Refraction, see REFLECTION AND REFRACTION OF LIGHT.

Refraction, Errors of, in the case of vision, are due to constitutional or pathological abnormalities in the cornea, aqueous humour, crystalline lens, and vitreous humour, whereby the rays of light are abnormally refracted, or to muscular changes leading to deficient accommodation. Presbyopia (old sight) is due chiefly

to loss of elasticity in the lens and contractile power of the ciliary muscles, with advancing age; near objects are indistinct. In hypermetropia (long sight) the eyeball is short and the focus of the rays lies behind the retina, producing a condition similar to presbyopia, but applying to objects at all distances; both are corrected by convex glasses. When the eyeball is long so that the focus lies in front of the retina, Myopia or short-sightedness is found; distant objects are indistinct or near objects have to be brought too close to the eyes. Eye-strain with watering and headache often accompany myopia; concave glasses, by slightly diverging the rays before entering the eye, can be so chosen as to throw the focus on to the retina, producing correct vision. Astigmatism may be simple, compound, or mixed. It is due to the abnormal shape of the cornea or lens, whereby the rays of light in different planes are not refracted to the same focus. It exists in every degree of complexity, but is *simple* when one meridian has correct refraction but the other is myopic or hypermetropic;



A, NORMAL VISION; B, HYPERMETROPIA (LONG SIGHT); C, MYOPIA (SHORT SIGHT)

compound when both meridians show errors of the same kind but differing in degree; *mixed* when one gives myopic, the other hypermetropic vision. Cylindrical glasses, correcting the eyes' curvature, are used to correct astigmatism. Asthenopia is eye-fatigue, due to overstrain of the muscles of the eye, or to neuropathic condition, consequent on the various defects of refraction. Anisometropia is the condition found when one eye has a considerable difference in error of refraction from the other eye. Suspected eye defects should be investigated by an ophthalmic optician or ophthalmic medical practitioner in consultation with the patient's own doctor. In some cases spectacles may be prescribed for close work (reading,

needlework, etc.), and in others constant use of spectacles will be found necessary.

Sight-testing is still the term used, mainly in everyday parlance, for describing eye examination. This is carried out by ophthalmic opticians and by ophthalmic medical practitioners, and includes a detailed consideration of the patient's symptoms and hist. The external and internal parts of the eyes are examined carefully, its movements and reflexes observed, and the refraction of the eyes is measured in order to detect any optical defects. In a straightforward case the procedure commences with a routine check on the health of the eyes by means of an ophthalmoscope (q.v.). The refraction of the eyes is then measured first by objective methods, which require no conscious assistance from the patient (retinoscopy). These results are then verified and possibly modified during a subjective examination in which the patient observes a series of graduated letters, and also answers questions about the relative clarity of groups of black lines (fans, squares, diamonds, etc.). All these tests together enable the practitioner to measure accurately the degrees of hypermetropia, myopia, astigmatism, presbyopia, that may be present. The patient's muscle balance, accommodation, and convergence are also considered, as these have an important bearing on visual comfort. Patients requiring more detailed examination may have their fields of vision measured and mapped for scotomata (blind areas), their colour vision tested, or further investigation of pupillary reflexes, ocular muscles, etc. Treatment known as orthoptics, which aims at strengthening weak muscles by exercises, may be given to patients with muscle abnormalities or where the 2 eyes do not work together comfortably—e.g. children with a squint or a tendency to squint.

See W. S. Duke-Elder, *The Practice of Refraction*, (6th ed.), 1954; J. Thorington, *Refraction of the Human Eye* (3rd ed.), 1939; H. Emsley, *Visual Optics*, (5th ed.), 1952; and G. H. Giles, *The Practice of Orthoptics*, (2nd ed.), 1949.

Refractories, materials, usually non-metallic, which are used in the construction of furnaces, flues, crucibles, etc., on account of their resistance to heat. Ideally a refractory should be able to resist: (1) the temp. to which it is likely to be exposed in use; (2) any pressure likely to be put upon it by adjacent masonry or by material in the furnace; (3) vibration such as may occur in movable furnaces (rotary furnaces), and any accidental blows, as from a poker or clinking iron; (4) slagging action of the contents of the furnace or kiln; (5) the cutting and abrasive action of flame and flue dust; (6) sudden changes of temp. Few R. fulfil all these requirements, and the user must make a compromise in selecting a refractory for his purpose. The chemical composition of R. should correspond to the reactions which occur in a furnace. For instance, basic substances should not be heated in refractory articles of an acid or

siliceous nature, and vice versa, since the two will react together to form a fresh compound (a salt), which is much less heat resisting than either the acid or the base taken separately. R., therefore, are classified according to their chemical behaviour: (1) acid materials, such as clays (chiefly fireclays), silica in forms of flint, quartz, sandstone, ganister, etc.; (2) neutral materials, such as chromite, graphite, or plumbago; (3) basic materials such as bauxite, lime, magnesia, zirconia, etc. There is another type of material, diatomaceous earth, which has relatively poor refractory properties, but is a good thermal insulator. It is, therefore, used behind more refractory linings of furnaces to minimise loss of heat. See METALLURGY.

Refrigerant, in medicine, an agent used for lowering the temp. or allaying thirst. The term is usually applied to those agents which give a feeling of coolness, the term *antipyretic* being reserved for remedies which actually lower the body temp. The most important antipyretics are cold, as in the wet pack, agents which produce perspiration, antipyrin, antifebrin, phenacetin, etc. Substances which afford relief to thirst without materially affecting body temp. are barley water, effervescent fruit drinks, potassium chlorate, potassium nitrate, etc.

Refrigeration, the cooling of a substance by artificial means.

It is popularly associated with the processing and preservation of foodstuffs, and in these fields it is of prime importance; it is, however, used widely in numerous other important fields. One of the more obvious examples is air conditioning: there are, however, many applications in industry, such as in the liquefaction of gases and the shrink fitting together of metal parts, in surgery such as hypothermia, in building construction, where the setting of poured concrete is assisted by the removal of the heat generated in the mass, in mining, where mud is hardened by freezing so that it may be more easily excavated, in problems of diminishing the skin heat of high-speed aircraft and guided missiles, etc. There are even applications in the field of entertainment, e.g. ice rinks. The lowest possible temp. is known as absolute zero; it is believed to be the temp. of outer space, and there is much speculation as to what happens to matter subjected to it. It is stated as minus 273° C., and physicists have gradually reached to within a fraction of a degree of it. R. methods and techniques have played an important part in this and other research, including that in which special climatic conditions have to be simulated.

Originally R. depended upon natural ice, which as it melts, extracts heat from a warmer substance with which it is in contact or proximity. During the 19th cent. an international trade in natural ice was so developed that it was harvested in Scandinavian countries and in New England and exported to the tropics and other parts of the world.

Also during the 19th cent. successful efforts were made to achieve cooling by mechanical means, the first patent for a R. machine being issued in Great Britain in 1834. The first true R. ship went into use in 1869; this development proved to be a highly significant factor in the economic advance of the S. Hemisphere, as it enabled Australia, New Zealand, and the Argentine to commence exporting foodstuffs, particularly meat, on a large scale. Nowadays mechanical refrigeration is so developed that almost every populous area has its 'cold chain' made up of refrigerated ships and vehicles, large cold warehouses in the docks and towns, smaller cold rooms in shops, hotels, hospitals, etc., and domestic refrigerators in the home. The manufacture of R. machinery is an estab. industry in many countries, being particularly large in both the U.K. and the U.S.A.

R. machinery is used to freeze water into ice, and in the process of liquefying gases or even to solidify them (e.g. carbon dioxide, then known as dry ice). These products are in turn used locally for extracting heat in a comparable manner to natural ice.

An important part of R. technique is the use of materials which insulate the cold space from its outside surroundings and the fitting of doors which, in addition to being insulated, are airtight when closed. When natural ice was shipped across the world the holds of the ships and the storage places were insulated with pine sawdust; to-day the most usual natural product for insulation purposes is cork-board, but there is a large and growing use of man-made products, such as glass wool and processed plastics.

Mechanical Refrigeration depends on 2 well-known physical properties: (1) that a liquid draws heat from its surroundings when it is expanded and evaporated, and (2) that a vapour gives up heat to its surroundings when it is compressed and cooled.

In the more ordinary cases refrigeration machinery is used to create inside a closed system of pipework running through an insulated chamber a continuous cycle in which a liquid evaporates in that part of the system which is inside the chamber and the vapour is compressed back into liquid in the part outside the chamber. The interior of the chamber is therefore having its heat expelled to the exterior, and consequently the temp. of the internal atmosphere goes down. The liquid is known as the refrigerant, and the pressures necessary to cause evaporation and liquefaction are created either by a pump known as a compressor or by direct heat giving expansion followed by contraction. The part of the system inside the chamber is known as the evaporator and that outside as the condenser.

The evaporator may easily be observed inside a domestic refrigerator, usually being shaped into a small compartment to hold ice trays and frozen foods; the condenser may be seen usually at the back.

Many fluids can be and have been used

as the refrigerant. There are important practical considerations which affect the choice. Apart from thermodynamic properties, it is necessary to consider corrosive effects on metals, toxicity, inflammability, ease of leak detection, and the pressures at which evaporation and liquefaction will take place. Carbon dioxide and ammonia are commonly used in large plants. Most smaller plants employ dichlorodifluoromethane, though in the recent past methyl chloride and sulphur dioxide have been used. Dichlorodifluoromethane is one of a group of halogenated hydrocarbons specially developed as a refrigerant.

The system is fitted with a device to regulate the flow of the refrigerant. On large plants manually operated valves may be adopted, but more commonly and particularly on automatic plants the pressure-reducing valve is thermostatically controlled so that it meters the refrigerant into the evaporator at precisely the correct rate for the cooling duty required. On domestic refrigerators careful design makes possible the use of a metering tube with no moving parts. The system is also generally fitted with a thermostat, which senses the temp. of the cold space and automatically stops and starts the machine as required.

Where the pressure necessary in the system is created by a compressor the machine is known as the vapour-compression type; where direct heat is used, it is known as the absorption type, these being the two main distinctions.

Vapour Compression Machines are almost universally used on larger plants, and account for a considerable proportion of domestic refrigerators. They consist essentially of a compressor of either rotary or reciprocating type driven usually by an electric motor, an internal-combustion engine, or a steam engine.

In domestic and other small refrigerators the compressor and the electric motor are both assembled on the same shaft; the whole assembly is then fitted into a steel container which is welded up, thoroughly dried and evacuated and then charged with lubricating oil. This construction is of somewhat recent development and has the advantages of reducing the risk of refrigerant leakage, eliminating the need for periodic lubrication and dispensing with driving belts which require adjustment and replacement. The complete article is known as the hermetically sealed unit and has increased reliability to an important extent.

Absorption-type Machines are so called because the refrigerant, usually ammonia, is absorbed into solution usually by water on the low-pressure side of the system, being driven out of solution by the heat on the high-pressure side. Hydrogen is also present, and the operation depends upon an application of Dalton's Law of Partial Pressures. In domestic refrigerators the heat is provided by an electric element or by a small flame of town gas, bottled gas, or paraffin. In large installations it may be provided by steam

or waste heat. Absorption machines are inherently less efficient than vapour-compression machines, but as they can be independent of an electric supply they have an advantage in undeveloped areas.

Other Machines and Methods. The steam jet vacuum system is a type of compression machine in which a steam jet thermo-compressor is employed and water is used as the refrigerant. Its application is limited to temps. just above the freezing point of water (0°C.) so that its principal uses are for large-scale air conditioning and for chilling industrial water. Another R. cycle, not relying on evaporation and liquefaction, is known as the cold-air machine or air-cycle system. This was first developed in the middle of the 19th cent. and, having been discarded in the meantime, is now being used again. The refrigerant used is air; the system may be actuated by lightweight high-speed turbo-compressors, so that its new use is for cooling aircraft cabins.

Thermo-electric cooling utilises what is known as the Peltier effect. If an electric current is passed through a circuit consisting of 2 conductors made of different metals joined together at both ends to form a ring, one junction becomes warmer than the other. If the warmer junction is cooled (by water or air), then the temp. of the other junction falls and extracts heat from its surroundings. This effect is small even from many pairs of such thermo-couples, but as a method of cooling it is being experimented with.

See American Society of Refrigerating Engineers, *Air-Conditioning Refrigerating Data Book-Design Volume*, and *Air-Conditioning Refrigerating Data Book-Applications Volume*, 1940; F. Griffiths, *Refrigeration Principles and Practice*, 1951; M. E. Anderson, *Refrigeration Note Book*, 1952; M. R. Anderson, *Questions and Answers on Refrigeration*, 1955.

Refuse, Disposal of. Public cleansing includes the collection of refuse from premises, the cleansing of streets, and the disposal of refuse resulting therefrom. The degree of service rendered by the local authority varies considerably, depending on the nature of the locality and the types of refuse which the local authority has undertaken to collect. Under the Public Health Act, 1936, a local authority may, and if required by the minister of health must, undertake the removal of house refuse and the cleansing of earth closets, privies, ashpits, and cess-pools. Where local authorities have undertaken any such service, they are liable to penalty on failure to perform the service within 7 days after notice by an occupier of premises. Where the local authority do not themselves render the services, they may require the occupier so to do. The local authority may require the owner or occupier of premises to provide approved dustbins, or else the authority may provide and maintain dustbins for which a charge of 2s. 6d. per annum per bin can be made. The local

authority may undertake the removal of trade refuse and may make a reasonable charge for this service. A local authority may, and if required by the minister of health must, undertake the cleansing of streets in either the whole or any part of their dist. The above applies to authorities outside London. In London the metropolitan bors. and the common council of the city of London must remove house refuse and cleanse and empty ashpits, etc.

At one time household refuse was stored and collected in ashpits. Now dustbins are employed for both trade and domestic premises, and most refuse collection consists of the removal of the contents of dustbins by special refuse-collecting vehicles. There are sev. types of vehicle, most of which can be classed as either side-loading or back-loading. The type selected depends on the locality: side-loading vehicles are perhaps the most popular, but rear-loading vehicles are particularly advantageous in windy dists., for they reduce the amount of dust and paper which is blown off the load. Many of the latter type involve special compressing mechanisms, to ensure full loads, and means of tipping or otherwise discharging. Special vehicles are provided for dealing with the refuse from blocks of flats, e.g. vehicles which deliver empty refuse trucks and take away full trucks for the disposal of their contents. Street-cleansing vehicles include watering-carts or lorries, sweeping mechanisms, gully-flushing tank vehicles, etc. For the emptying of cesspools and septic tanks, special cesspool-emptying vehicles are available. Some of these can also be used for the removal of night soil.

The cost of refuse disposal, which is usually an appreciable charge on the rates, depends partly upon the service rendered; but the keynote of refuse collection is efficient organisation. Owing to the varied routes that have to be taken by vehicles, the planning of itineraries is of great importance; and because the amount of material to be removed varies seasonally, considerable thought has to be given to the labour problem, if overtime and waste of labour are to be avoided.

Methods of disposal of refuse include tipping on land; dumping at sea; incineration (see DESTRUCTORS); conversion to fertiliser by composting with sewage sludge, or pulverisation and mixing with dried sludge; digestion either of the refuse alone, or in combination with sewage sludge. By far the greater quantity of refuse is disposed by controlled tipping, i.e. tipping according to plan so as to avoid nuisance. Next are incineration and crude or uncontrolled tipping; other methods of disposal are rarely employed. At one time, when tips were not properly controlled and were very insanitary, incineration was considered greatly preferable to tipping. But in 1922 the Ministry of Health issued a 'list of precautionary measures for abating and preventing nuisances arising from refuse

tips' which, with slight emendation, was reproduced in the ministry's report for 1931-2. This had the effect of making 'controlled tips' generally popular. In brief, the rules laid down by the ministry were that the deposit should be made in layers of limited depth and each layer covered on all exposed surfaces by 9 in. of earth or other suitable material, care being taken that only a limited surface of refuse should be exposed at any time during the process of tipping, and that no refuse should be left uncovered for more than 24 hours after the time of deposit. It was also required that screens or other suitable apparatus should be provided to prevent paper or other debris from being blown by the wind. In addition, it was required that deposit in water must be avoided as far as practicable if likely to cause nuisance, and reasonable precautions taken against the breeding of vermin or flies or the breaking out of fires. Refuse consisting mainly of organic material must be covered with not less than 2 ft. of earth; each layer of refuse must be allowed to settle before the next is added; care must be taken to avoid raising the surface of the tip above the general level of the adjoining ground; competent labour must be employed to enable the necessary measures to be taken for the prevention of nuisance; all refuse must be disposed of with such dispatch and be so protected during transit as to avoid risk of nuisance.

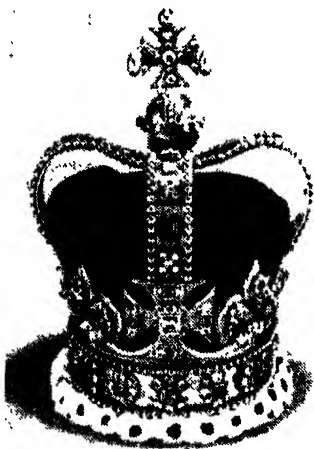
Considerable quantities of salvage are now separated during the processes of refuse collection and disposal. Early sorting—i.e. on the vehicle—is advantageous, for some materials greatly deteriorate in value if not segregated as soon as possible. At the tip or destructor site, sorting is effected partly by mechanical screening and partly by hand picking. In some plants iron is removed by magnets. The nature of refuse has changed in recent years, having now a lower calorific value than formerly, and this renders incineration more expensive. Digestion of refuse with sewage sludge, besides disposing of organic material without nuisance, provides additional quantities of methane which can be used for power for heating purposes. See also DESTRUCTORS; PUBLIC HEALTH; SANITATION OF BUILDINGS; SEWERAGE. See E. R. Matthews, *Refuse Disposal*, 1915; A. L. Thomson, *Modern Public Cleansing Practice*, 1939; Amer. Public Works Association, Committee on Refuse Collection and Disposal, *Refuse Collection Practice*, 1941.

Regal, small portable organ, said to have been invented about 1460 by Heinrich Traxdorf of Nuremberg, but existing in various forms much earlier as the portable or positive organ, which could be held by a band slung round the player's neck, one hand playing the keys and the other working the small bellows, or placed on a table, with the bellows worked by the feet or by another person.

Regalia: 1. The ensigns or visible marks of royalty, or, in a more accurate

and restricted sense, the sev. parts of the apparatus of a coronation. Though different countries have very different R., or crown jewels, varying greatly in value, a richly jewelled crown is commonly the chief of the insignia of sovereignty. In England the chief lt. proper are the 3 crowns, the queen consort's crowns or diadems, the king's royal and other sceptres, the 2 orbs, the jewelled sword of state and 4 other state swords, the ampulla and spoon, the golden spurs of chivalry and coronation ring, the state trumpets, and the bracelets or armilla. The lt. of Scotland comprise the crown, sceptre, sword of state, and mace. The Eng. R. are kept in the Tower of London, those of Scotland in Edinburgh Castle. The Irish crown jewels were stolen from Dublin Castle and have never been found, but they comprised nothing of any great intrinsic value.

The Crowns: The crown of England is the crown copied from St Edward's crown

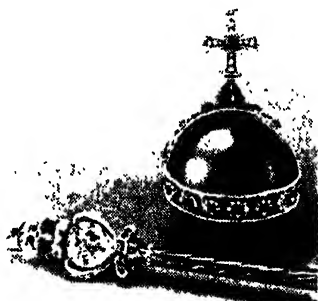


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ST EDWARD'S CROWN

in the time of Charles II, the original having been destroyed by the Protectorate. It is a circlet of gold embellished with rosettes of precious stones, ringed by diamonds. From the circlet rise 4 crosses-paté and fleurs de lis, and from the former rise golden arches symbolising independent sovereignty. The Imperial state crown is worn, after the coronation, by the reigning monarch on state occa-

sions. The existing crown was made for Queen Victoria in 1838, and its constituent gems are of very ancient origin. They include a sapphire from Edward the Confessor's ring, the Black Prince's ruby, a sapphire from the crown of Charles II, pearl ear-drops of Queen Elizabeth I, and in front is the second Star of Africa, weighing 309½ carats, cut from the



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THE SOVEREIGN'S ORB AND SCEPTRE

Cullinan diamond. Altogether the crown, the most beautiful of all crowns, has 2783 diamonds, 277 pearls, 17 sapphires, 11 emeralds, and 5 rubies. The Imperial crown of India was made on the occasion of the Durbar held by George V, because neither of the above-mentioned crowns may be taken out of Britain. It has 6000 diamonds, 4 sapphires, 4 rubies, and 6 emeralds, all of unusual size and quality. It is designed on the pattern of the crown of England. The crown of Mary of Modena, consort of James II, is studded with diamonds and pearls, and her diadem of diamonds and pearls, which latter is reputed to be worth more than £100,000. Queen Mary's crown was the personal property of the Dowager Queen Mary, widow of George V. It is a beautiful light diamond crown, with detachable half-arches and bears in front the Koh-i-noor diamond. The Prince of Wales's crown resembles a peer's coronet, but has one arch over it supporting a gold monde and cross. It was made specially for Edward VIII when he was Prince of Wales. *The Sceptres:* The royal sceptre, with the cross, is enriched with gems, including the larger Star of Africa, cut from the Cullinan. The other 4 sceptres in the R. are the king's and queen's sceptre with the dove, the queen's sceptre with the cross, and the queen's ivory rod. *The Orbs:* The orb and cross together are held to signify the domination of the Christian religion over the world. There are 2 orbs, the queen's having been made

on the occasion of the joint coronation of William and Mary. The king's orb is of polished gold, studded with large pearls, rubies, sapphires, and emeralds, and is larger than the queen's. *The Sword of State*: The jewelled sword is made of Damascus steel, the scabbard being studded with precious stones. It originates from the coronation of George IV; at the coronation ceremony the monarch hands it to the Archbishop of Canterbury as a symbol that he puts his sword at the service of the Church. It is said to be the most valuable sword in the world. *The Four State Swords*: The sword of state is a 2-handed sword, with a blade 32 in. long, gilt metal handle, and cross-pieces representing the lion and unicorn. The scabbard is adorned with precious stones in designs of the rose, the thistle, and the shamrock. At coronation ceremonies the peer who carries it hands it to the lord chamberlain, who gives him in exchange the jewelled sword; the second sword is the sword of justice to the spirituality; the third the sword of justice to the temporality; and the fourth is known as Curtana, and has the blade curtailed and squared to symbolise mercy. *The Ampulla and Spoon*: The ampulla or golden eagle and the anointing spoon are used at the coronation for anointing the monarch. They are very ancient, appear to be of Byzantine origin, and luckily escaped the Puritanical hand of the Protectorate. *The Spurs and Coronation Ring*: Like the jewelled sword, the spurs of St George are placed on the altar by the monarch at his coronation, with the same symbolical significance. The spurs are the emblem of knighthood and chivalry, and were made for the crowning of Charles II. The ring of rubies and one very fine sapphire circled with diamonds represents in design the cross of St George. *The State Trumpets*: The state trumpets are of silver, with red and golden silk bannerets with royal arms and cipher; they are used for fanfares on great state occasions such as the reading of proclamations. *The Bracelets or Armills*: From the earliest time, even in ancient Hebrew days, a bracelet was one of the insignia of royalty. Bracelets of gold, with champlevé enamel decoration in the form of rose, harp, thistle, and fleur de lis, were made for Charles II, but were never actually worn in a coronation ceremony. At her coronation on 2 June 1953, Queen Elizabeth II was invested with armills made of plain gold ornamented with a Tudor rose; these were a gift from the countries of the Commonwealth, the gold being provided by all the members of the Commonwealth with gold-mining industries. See H. D. W. Sitwell, *The Crown Jewels and other Regalia in the Tower of London*, 1953.

Of European R. there is extant the crown, the sword (*La Joyeuse*), and spurs of Charlemagne. The crown is fashioned of gold plates, enamelled with representations of Solomon, David, Hezekiah, and Christ. The sword has a golden scabbard with cloisonné enamel and precious

stones; Napoleon I brought it from Vienna to the Louvre in Paris. The Bourbon crown, introduced by Louis XIV, was generally adorned lavishly with diamonds, surmounted by a double fleur de lis. The Fr. crown diamonds and gems were frequently reset for each succeeding monarch, but many famous jewels and stones were lost during the revolution. The leading example of it, R. is the iron crown of Lombardy, consisting of a broad band of gold with rosettes of enamel and precious stones, with an inner circlet of iron supposed to have been wrought from a nail of the true cross. The crown of the former Ger. empire, dating from the Franco-Ger. war of 1871, is fashioned on the model of that of Charlemagne. Most of the former Ger. states each had their own crowns and jewels. Austrian R. included the imperial crown made for Rudolph II, and the older crown of Hungary or St Stephen of the 10th cent. The imperial crown made for Catherine II of Russia was one of the sumptuous items of the R. of the Romanoffs, which were formerly kept at the Winter Palace. Another is the imperial orb surmounted by a diamond cross, and especially the imperial sceptre with the famous Orloff diamond, a wonderful yellow stone, set atop. Tradition says that this gem was looted from an idol in a Hindu temple and sold to an Armenian trader, who in his turn sold it for £40,000 to Prince Orloff, who gave it to Catherine II in 1772. The Soviet Gov. have valued it at £2m. Spain possesses sev. fine emeralds among her crown jewels, and might have had more had Hernando Cortez acted on Queen Isabella's hint and handed over to her all he brought back from his conquest of Mexico. See Mary Abbott, *Jewels of Romance and Renown*, 1933.

2. The attributes or privileges of R. belonging by virtue of his prerogative to the sovereign, which, according to writers on civil law (q.v.) comprise the power of life and death, war and peace, the administration of justice, monopoly of coinage, the power of assessment and the ownership of waifs, estrays, royal fish, treasure trove, etc. See also CROWN.

Regality, Burgh of, see BURGH.

Regelation, see ICE.

Regency Style, see ENGLISH ARCHITECTURE.

Regeneration, in physiology, the repair or renewal of lost or diseased structures, as, for example, the regrowth of a tail by a lizard. The phenomenon of R. must be considered in relation to ascertained facts about the growth and reproduction of cells. Every organism has developed from a single cell. The initial cell, therefore, must be considered as having within it the potentiality for completing the organism. This potentiality, however, is a highly complex thing, and, as the cell divides and still further subdivides, certain aspects of this potentiality tend to become prominent, and others are thrust into the background, even to the point of obliteration. In other words, cells are differentiated to perform more or less

specialised functions, to form nerve, muscle, epithelium, etc. It should not be supposed that the specialisation is ever complete, for under certain circumstances the cell may modify its function to adapt itself to an abnormal condition. This adaptation may lead to the formation of a structure similar to one which has been lost by accident or disease. The extent of the adaptation appears to vary considerably in different organisms. Some structures can be replaced only by the action of cells of the same general form; thus, in man, lost epithelium is replaced from epithelium. Other organisms have the power of replacing homologous structures in a complex degree. In other cases the potentiality of the cells to reproduce quite a different structure seems to have persisted; thus certain insects have been known to produce a wing in place of a leg, and lobsters have produced a limb in place of an eye-stalk. The capacity for R. seems to be greater among the lower animals. Amphibia are able to replace the whole epidermis, salamanders replace their limbs, lizards their tails. Arthropods regenerate their limbs; molluscs are able to replace heads and feet, fishes can replace their fins. Among birds and mammals the capacity for R. is very restricted. Birds replace feathers in the process of moulting; mammals replace hair, skin, and horns. In man it may generally be said that lost parts can be replaced only by adjacent tissue of the same kind; broken bones reunite, and flesh wounds heal if the parts are put in juxtaposition. If epithelium is extensively destroyed, as in the case of a burn, it is replaced by scar-tissue. Plants have great powers of R., and use is made of those powers in the propagation of cultivated species from cuttings, grafts, etc. It is said that some weeds, such as the horse-radish, can be completely regenerated by any fragment containing a few intact cells.

Regeneration (being born again), theological term derived from the words of Christ to Nicodemus: 'Except a man be born again (or from above) he cannot see the kingdom of heaven.' In Rom. Catholic Theology R. is identified with the reception of sanctifying grace in baptism and the term means initial justification. Protestants, on the other hand, think R. a sensible change of heart and life, not necessarily connected with any external rite.

Regensburg (Fr. Ratisbonne; anglicised Ratisbon), Ger. city in the *Land* of Bavaria (q.v.), on the Danube (q.v.) at its confluence with the Regen, 65 m. NNE. of Munich. It was originally a Celtic settlement, and, later, an important Rom. fortress. It was the H.Q. of Marcus Aurelius (see AURELIUS ANTONINUS) during his Ger. campaigns. It became a bishopric in 739 and a free city of the Empire in 1245. During the Middle Ages it was a prosperous mercantile tn. In 1541 it was the scene of the Interim Diet between Catholics and Lutherans (see INTERIM). The Reich-

stag (q.v.) met in R. from 1613 until 1806; and in 1810 the city became a Bavarian possession. There are picturesque streets and squares, with many fine old mansions. The Gothic cathedral, begun in 1276 and completed in 1534, contains beautiful stained glass; there are sev. other notable churches, 3 of which date from the 13th cent. The Gothic *Rathaus* was formerly the meeting-place of the Reichstag. The palace of the Princes of Thurn und Taxis was formerly an abbey; its chapel is partly 8th cent. The Danube at R. is spanned by a 12th-cent. bridge, which in the Middle Ages was looked upon as a great engineering achievement. There are harbour installations on the riv., and there are manufs. of machinery, porcelain, chemicals, beer, pencils, and tobacco. Pop. 123,500.

Regent, one who exercises the power of sovereign during the absence or incapacity of the sovereign. No provision was made for a R. during the temporary absence of the sovereign between 1837—when it was provided that the gov. should be carried on by lords justices in the event of the queen's decease whilst the heir (the King of Hanover) was abroad—and 1937. The office of R. in early times usually fell to the justiciar (q.v.) in the event of the sovereign's absence. The chief instances of R.s in Eng. hist. between 1190 and 1837 illustrate the transition from the despotic Norman and Angevin or Plantagenet kings to the struggle between the king and barons over the limitation of royal power and, thereafter, to the constitutional control of the royal power and prerogative. In 1190 Richard I on departing for the crusade appointed the chancellor, Wm Longchamp, guardian of the kingdom. In 1216, owing to the minority of Henry III, the barons chose Wm Marshall, Earl of Pembroke, *rector regis et regni*. In 1272, at the death of Henry III, the king's council assumed the functions of regency because the heir (Edward I) was abroad. In 1297 Edward I, on joining his army in Flanders, left his son Prince Edward as Lt., together with an assisting council of regency. In 1327, at the accession of Edward III, a minor, Parliament appointed a regency of bishops, earls, and barons. In 1377 in Richard II's minority no R. was appointed, but a council of 12 was named by the barons, though this council was frequently modified by Parliament, which had the real control. In 1422 Henry V, at his death, named the Duke of Gloucester R., but the peers found that the late king could not, without the assent of the estates, dispose of the gov. after his death. Accordingly Parliament appointed the Duke of Bedford or, in his absence, the Duke of Gloucester. Sixteen counsellors were subsequently added by Parliament, and the peers declared that the protector's power was limited to defence of the realm against internal and external enemies. In 1454, owing to Henry VI's insanity, the peers chose Richard, Duke of York, protector, and Parliament confirmed the appointment.

In 1483, on the accession of Edward V, Richard, Duke of Gloucester, was appointed protector by the king's council. In 1547 16 executors were appointed as a regency during the minority of Edward VI—this being in accordance with a statute of 1536; these executors chose the Earl of Hertford as protector. In 1751 a Regency Act, passed on the death of Frederick, Prince of Wales, made the princess dowager of Wales R. in the event of a child of hers succeeding under 18, and also nominated a council or regency. In 1765 owing to the illness of George III a Bill was passed appointing a council of regency and defined their duties; the king was empowered to nominate either the queen, the princess dowager of Wales, or any descendant of George II. In 1788 George III became insane, and Fox supported the right of the Prince of Wales to be R., but Pitt maintained the right of Parliament to make the appointment. It was decided to create a regency by statute, which of course required the royal assent, and eventually the 2 Houses of Parliament concurred in directing the chancellor to put the great seal to a commission for giving the royal assent; but the king recovered before the Bill was carried. In 1810 George III again became insane and the Prince of Wales was appointed R., the Bill was passed (1811), and the royal assent given by commission. The R.'s power was limited; he could not, for 12 months, create peers nor grant offices and pensions, except during pleasure. The provision made in 1837 has been stated above. It was further provided (1840) that in the event of a child of the queen succeeding under 18, the prince consort was to be R.

Of these appointments those in the reign of George III are of the greatest constitutional importance. It was then settled that no one, not even the heir apparent, had the right to be R. without nomination. In case of a minority, Parliament would pass a provisional Act to meet the requirements of the particular case. Thus in 1830 a Regency Bill provided for the administration of the gov. in case the Princess Victoria should succeed before her majority; and again, in 1910, Queen Mary was nominated R. in case of the death of George V leaving a minor as heir. Further legislation was passed in 1937 and 1943; the Regency Act, 1937, provides that in the event of the illness of the sovereign or of his absence or intended absence from the U.K., certain of the royal functions may be delegated to persons who are nominated counsellors of state, e.g. the queen, the Duke of Gloucester, the Duke of Kent (d. 1942), but from among the persons in the line of succession to the Crown who may be nominated, the Act excludes any who are not of full age. The amending Act of 1943, however, provides for inclusion of the heir apparent or heir presumptive if over the age at which the accession of the sovereign does not necessitate a regency, viz. 18. Under the Act of 1937 the heiress (Princess Elizabeth) while between the ages of

18 and 21 could have succeeded the sovereign with full powers, but could not have been his deputy. The Act of 1943 therefore provides that 'the heir apparent or heir presumptive to the throne, if not under 18 years, shall not be disqualified from being a Counsellor of State by reason only of his not being of full age.' The Act of 1937 further provides that the sovereign or the R. may in the event of illness not amounting to incapacitation, or absence from the U.K., delegate to the counsellors certain of the royal functions, which would not include the power to dissolve Parliament or grant a peerage. The 1953 Regency Act provided for the Duke of Edinburgh (if alive) to act as R. if a child of Elizabeth II succeeded her while under the age of 18 or if a Regency became necessary during her reign, unless a child or grandchild could act as R.; and added Queen Elizabeth the Queen Mother to the persons to whom royal functions could be delegated as counsellors of state.

Regent Street, a fashionable shopping centre in London, running from Pall Mall to Langham Place, where it joins Portland Place. It was originally planned by John Nash to connect Carlton House with Regent's Park (q.v.). None of Nash's architecture survives in R. S. itself, but All Souls Church in Langham Place was designed by him, and so was the impressive Park Crescent at the N. end of Portland Place.

Regent's Park, London (410 ac.), was laid out, on the site of the old Marylebone Gardens and some pasture land, by John Nash for the Prince Regent, later George IV. It was part of a scheme, begun in 1812, to connect the Prince's residence of Carlton House in the Mall with another residence (never built) in the new park. Nash designed grand terraced residences overlooking a landscaped park, the most impressive being Cumberland Terrace. Two of the terraces were designed by Decimus Burton. The park was opened to the public in 1838. Most of the houses are now used as gov. offices. In the park are the Zoological Gardens and Bedford College for Women, and the Regent's Canal runs through it. See John Summerson, *Georgian London*, 1946.

Reger, Max (1873-1916), Ger. composer, b. Brand, Bavaria, studied with Riemann, and became teacher in 1895-6 at Wiesbaden Conservatory, later prof. there after 1907. His music is of consummate technical skill, with very great dexterity of contrapuntal part-writing, and usually of great difficulty, but its undoubted individuality, which was thought extremely advanced, is now seen to have been due merely to a new manipulation of orthodox procedures: e.g. the modulations are novel, but the harmony is not. His best work was for the organ, but he also composed many works for orchestra and piano, and numerous songs. Variations on a theme proved the best mode for his ideas, and with Brahms he is the best exponent of this form in the 19th cent. His work includes chamber and church

music, tone-poems, fugues, etc. See lives and studies by K. Hasse, 1821; H. Unger, 1921, 1924; G. Bagler, 1923; S. Kallenberg, 1930; E. Regor, 1930; F. Stein, 1939, 1941; and L. Taube, 1941.

Reggio di Calabria: 1. Prov. of Italy, in S. Calabria (q.v.). It is the most S. portion of the 'toe' of Italy, and is bordered on the NW. by the Tyrrhenian Sea, on the E. and S. by the Ionian Sea, and on the W. by the Strait of Messina (qq.v.). There are wide coastal plains, but the centre of the prov. is a mt mass, including Aspromonte (q.v.). There are numerous riv. valleys; the chief rivs. are the Amendolea, Marro, and la Verde. The prin. tns include R., Cittanova, and Mammola (qq.v.). Area 1255 sq. m. Pop. 649,000.

2. (anc. Rhegium), It. seaport, cap. of the prov. of R., and chief tn of Calabria, on the Strait of Messina, 310 m. SSE. of Rome (q.v.). Originally a prosperous Gk colony, it came into the hands of the Romans in 281 BC. Later it was taken at different times by the Goths, Saracens, and Normans (qq.v.). It was destroyed in earthquakes in 1783 and 1908 (when 35,000 persons perished), and on each occasion was rebuilt. There is an archiepiscopal cathedral and an important museum. The prin. industries are fruit preserving and the manuf. of silk, olive oil, and furniture. Pop. (com.) 139,500.

Reggio nell'Emilia: 1. Prov. of Italy, in central Emilia-Romagna (q.v.). The S. half of the prov. is in the Apennines (q.v.), the highest point being Monte Prado (6690 ft). In the N. the prov. forms part of the great N. plain of Italy, and is watered by the Po (q.v.), the Enza, and the Secchia. Rice, cereals, fruit, wine, chestnuts, and olives are produced, and there are also some minerals, notably copper, sulphur, and iron. The prin. tns include R. and Correggio (qq.v.). Area 905 sq. m. Pop. 388,000.

2. (anc. Lepidum Regium) It. tn, cap. of the prov. of R., on the Crostolo, 36 m. NW. of Bologna (q.v.). It is on the Emilian Way (q.v.). It has a 13th-cent. cathedral, with an unfinished façade, containing some fine Renaissance statues. There are sev. other beautiful old churches, museums, picture galleries, and a theatre (1857), which is one of the finest in Italy. The tn is the centre of a rich agric. dist., and has textile, agric. implement, and locomotive industries. Ariosto (q.v.) was b. here. Pop. (tn) 56,700; (com.) 106,800.

Regiam Majestatem, title given to a collection of anc. laws, reputed to have been compiled by order of David I, King of Scotland (see Scott, *Border Antiquities*). The general assumption is that this compilation is a mere copy of the celebrated *Tractatus de Legibus Anglorum* of the justiciar Ranulf de Glanville.

Regicides, term applied to people who bring about the death of a king, more particularly in Eng. hist. to the men who were appointed on the parl. committee to try King Charles I, and in Fr. hist. to the members of the Fr. Convention who voted

for the death of Louis XVI. After the Restoration the Eng. R. were brought to trial, some were executed and some sentenced to imprisonment for life, while, of those who were dead already, Cromwell, Ireton, and Bradshaw were condemned, and their bodies hanged at Tyburn.

Regillus, lake of anc. Italy, near the Tuscan Hills, in Latium, scene of a battle in 496 BC, between the Romans and the Latins.

Regiment (Late Lat. *regimentum*, from *rego*, I rule), largest permanent unit of the Brit. Army. The development of the R. may be dated from the 16th cent., when armies were permanently organised in companies and R.s. The earliest form of organisation of cavalry was in troops (q.v.) and of infantry in companies, each of which carried its own banner long after they were organised into R.s. As warfare became more scientific, the battalion and the squadron were introduced as the fighting formations of infantry and cavalry respectively. At first battalions were composed of many R.s, and were gradually reduced till they formed only fractions of a R. Finally, R.s were made of uniform strength, and the battalion became a fixed fraction of a R. but in the Brit. Army most R.s consisted of only 1 battalion until the army was reorganised in 1881. In that year the 1-battalion R.s were linked in such a way as to ensure that every infantry R. had at least 2 regular battalions. All R.s were localised, and the militia and volunteer units in their area were joined to them. The arrangement by which each R. (save in special circumstances) had 2 regular battalions continued until the period after the Second World War. The first steps to disband the 2nd battalions were taken in 1947, but it was not until 1957 that the process was completed. A R. of infantry comprises regular and territorial army battalions, and all are under the 'Colonel of the Regiment,' who is usually a distinguished general officer who has served in the R. The R.s of Foot Guards, however, have no territorial battalions, and the number of their regular battalions varies—Grenadiers 3, Coldstreams 3, Scots 2, Irish 2, and Welsh 1. Corps like the Corps of R.E., Royal Corps of Signals, R.A.S.C., etc., are R.s to all intents and purposes, but there is no battalion organisation. In the U.S.A. an infantry R. consists of a headquarters, 1 H.Q. company, 1 service company, 1 cannon company, 1 anti-tank company, and 3 battalions. A U.S. cavalry R. consists of 1 regimental H.Q., 1 H.Q. troop, 1 service troop, and 2 squadrons. In most foreign armies a R. is commanded by a colonel, whilst the executive command of the battalions is held by majrs. (or commandants). The First World War brought into being tank R.s and armoured-car R.s, while many of the police and pioneer R.s have disappeared, particularly those of the Indian Army. In the Second World War there was also the Royal Air Force R. There exist 2 main methods of identification of R.s, viz. numbering and

Regiment

495

Regiment

No.	Date Raised	Title in 1881
1*	1633	Royal Scots
2*	1661	Queen's Royal West Surrey
3*	1665	Buffs (East Kent)
4*	1680	Lancaster
5*	1685	Northumberland Fusiliers
6*	1673	Warwickshire
7	1685	Royal Fusiliers
8	1685	King's Liverpool
9	1685	Norfolk
10	1685	Lincolnshire
11	1685	Devon
12	1685	Suffolk
13*	1685	Somerset Light Infantry
14*	1685	West Yorkshire
15	1685	East Yorkshire
16*	1688	Bedfordshire
17*	1688	Leicestershire
18*	1684	Royal Irish
19	1688	The Green Howards
20	1688	Lancashire Fusiliers
21*	1678	Royal Scots Fusiliers
22	1689	Cheshire
23*	1689	Royal Welch Fusiliers
24	1689	South Wales Borderers
25*	1689	King's Own Scottish Borderers
26	1689	1st Cameronians (Scottish Rifles) (see 90)
27	1690	1st Inniskilling Fusiliers (see 108)
28*	1694	1st Gloucestershire (see 61)
29	1694	1st Worcestershire (see 36)
30	1702	1st East Lancashire (see 59)
31	1702	1st East Surrey (see 70)
32	1702	1st Duke of Cornwall's Light Infantry (see 46)
33*	1702	1st West Riding (see 76)
34	1702	1st Border (see 55)
35	1701	1st Royal Sussex (see 107)
36	1701	2nd Worcestershire (see 29)
37	1702	1st Hampshire (see 67)
38	1702	1st South Staffordshire (see 80)
39	1702	1st Dorset (see 54)
40	1712	1st South Lancashire (Prince of Wales's Volunteers) (see 82)
41	1719	1st Welch (see 69)
42*	1743	1st Black Watch (see 73)
43	1741	1st Oxford and Buckinghamshire Light Infantry (see 52)
44	1741	1st Essex (see 56)
45*	1740	1st Sherwood Foresters (see 95)
46	1741	2nd Duke of Cornwall's Light Infantry (see 32)
47	1741	1st North Lancashire (see 81)
48	1741	1st Northamptonshire (see 58)
49	1741	1st Royal Berkshire (see 66)
50	1755	1st Queen's Own Royal West Kent (see 97)
51	1755	1st King's Own Yorkshire Light Infantry (see 105)
52	1741	2nd Oxford and Buckinghamshire Light Infantry (see 43)
53	1755	1st Shropshire Light Infantry (King's) (see 85)
54	1755	2nd Dorset (see 39)
55	1755	2nd Border (see 34)
56	1755	2nd Essex (see 44)
57	1755	1st Middlesex (see 77)
58	1750	2nd Northamptonshire (see 48)
59	1755	2nd East Lancashire (see 30)
60*	1755	King's Royal Rifle Corps (formerly Royal Americans)
61	1756	2nd Gloucestershire (see 28)
62*	1757	1st Wiltshire (see 99)
63	1756	1st Manchester (see 96)

No.	Date Raised	Title in 1881
64	1756	1st North Staffordshire (was 2nd/11th till 1758) (see 98)
65*	1756	1st York and Lancaster (see 84)
66	1756	2nd Royal Berkshire (see 49)
67	1756	2nd Hampshire (see 37)
68*	1756	1st Durham Light Infantry (see 106)
69*	1756	2nd Welch (see 41)
70	1758	2nd East Surrey (see 31)
71*	1766	1st Highland Light Infantry (see 74)
72*	1778	1st Seaforth Highlanders (see 78)
73*	1786	2nd Black Watch (see 42)
74	1787	2nd Highland Light Infantry (see 71)
75	1787	1st Gordon Highlanders (see 92)
76	1787	2nd West Riding (see 33)
77	1787	2nd Middlesex (see 57)
78*	1793	2nd Seaforth Highlanders (see 72)
79*	1793	Cameron Highlanders
80	1793	2nd South Staffordshire (see 38)
81	1793	2nd North Lancashire (see 47)
82	1793	2nd South Lancashire (see 40)
83*	1793	1st Royal Irish Rifles (see 86)
84	1793	2nd York and Lancaster (see 65)
85	1794	2nd Shropshire Light Infantry (King's) (see 53)
86	1790	2nd Royal Irish Rifles (see 83)
87*	1793	1st Royal Irish Fusiliers (see 89)
88*	1793	1st Connaught Rangers (see 91)
89	1794	2nd Royal Irish Fusiliers (see 87)
90	1794	2nd Cameronians (Scottish Rifles) (see 26)
91*	1794	1st Argyll and Sutherland Highlanders (see 93)
92	1794	2nd Gordon Highlanders (see 75)
93*	1800	2nd Argyll and Sutherland Highlanders (see 91)
94*	1800	2nd Connaught Rangers (see 88)
95*	1800	2nd Sherwood Foresters (see 45)
96	1800	2nd Manchester (see 63)
97	1798	2nd Queen's Own Royal West Kent (see 50)
98	1824	2nd North Staffordshire (see 64)
99	1824	2nd Wiltshire (see 62)
100*	1858	1st Leinster (see 109)
101*	1861	1st Munster Fusiliers (see 104)
102*	1861	1st Dublin Fusiliers (see 103)
103*	1861	2nd Dublin Fusiliers (see 103)
104*	1861	2nd Munster Fusiliers (see 101)
105*	1861	2nd King's Own Yorkshire Light Infantry (see 51)
106*	1861	2nd Durham Light Infantry (see 68)
107*	1861	2nd Royal Sussex (see 35)
108*	1861	2nd Inniskilling Fusiliers (see 27)
109*	1861	2nd Leinster (see 100)
	1800	1st Rifle Brigade
	1805	2nd Rifle Brigade
	1855	3rd Rifle Brigade
	1857	4th Rifle Brigade

territorial names. For active service purposes R.s are allotted distinctive abbreviated titles for correspondence and intercommunication, such as by telegraph and telephone.

INFANTRY. On p. 495 will be found a list of Brit. Infantry R.s of the line, in order of seniority down to the absorption of the East India Company's army in 1861.

* *Notes.* 1. From 1633 to 1636 known as Hepburn's R. It was recalled from Fr. service by Charles II and named and given precedence by him. 2. Under Charles II called the Tangier Foot. 3. Under Charles II called the Holland R., because it was formed from troops discharged from the Dutch service. 4. The King's Own Royal R. 6. Until 1688 served the Dutch Gov. on contract. 13. Prince Albert's. Became Light Infantry in 1822. 14. The Prince of Wales's Own. 16. From 1792 to 1809 was the Buckinghamshire R. 17. Princess Alexandra's Yorkshire R. 18. Disbanded in 1922. 21. Raised on the Scottish Estab. as the Earl of Mar's R. 23. From independent companies raised in 1686. 25. Originally Leven's R. It received its present title in 1805. 28. Originally Bragg's R. 33. The Duke of Wellington's R. 42. From independent companies formed in the reign of William and Mary and amalgamated in 1729 as the Royal Highlanders. It reverted to the old title in 1751. 45. The Nottinghamshire and Derbyshire R. 60. As the Royal Americans had 4 battalions, of which the second after the revolution became the 60th Rifles of Canada and the 3rd became the 63rd R. of Nova Scotia. The first battalion was transferred to the U.K. estab. and also formed 3 new battalions, which continued to exist until 1922. 62. Originally 2nd Lancaster R. 65. 2nd Suffolk until 1758. 68. 2nd Royal Welch Fusiliers until 1758. 69. 2nd South Wales Borderers until 1757. 71. City of Glasgow R. 73. Until 1786 this number was borne by the 1st Highland Light Infantry (71). 78. This number was held also by Fraser's Highlanders, raised in 1756 and disbanded in 1764. 83. Became Royal Ulster Rifles in 1922. 87. Princess Victoria's. 88. Disbanded in 1922. 91. Formerly Argyll Foot. 93. Formerly Sutherland Foot. 94. Disbanded in 1922. 95. Two battalions of this R. were raised in 1800 and 1805. In 1816 they adopted the title Rifle Brigade and were taken out of the line, and a new 95th R. was formed which became the 2nd Sherwood Foresters. The 3rd and 4th regular battalions of the Rifle Brigade were disbanded in 1922. 100. Originally raised in Canada as the Prince of Wales's Royal Canadians; disbanded in 1922.

101-109. Transferred from East India Company's service. 101. Ex-Royal Bengal Fusiliers, raised in 1759. 102. Ex-Royal Madras Fusiliers, raised in 1746; later called Madras European R. 103. Ex-Bengal Fusiliers, raised in 1661 as the Bombay R., and later called Royal Bombay Fusiliers. 104. Raised in 1839 as

2nd Bengal European R. 105. Raised in 1839 as the 2nd Madras European Light Infantry. It became the Madras Light Infantry and transferred to the U.K. in 1861. 106. Ex-Bombay Light Infantry, raised in 1839 as 2nd Bombay European Light Infantry. 107. Raised in 1854 as 3rd Bengal European R. 108. Ex-3rd Madras Europeans, raised in 1854. 109. 3rd Bombay Europeans, raised in 1882. The regiments and battalions bearing the Nos. 18, 88, 94, 100, 101, 102, 103, 104, and 109 before 1881 were disbanded in 1922. In 1957 it was announced that the regiments which had once borne the following numbers would be amalgamated: 2nd, 31st, and 70th; 3rd, 50th, and 97th; 4th, 34th, and 55th; 8th 63rd, and 96th; 9th and 12th; 10th, 48th, and 58th; 11th, 39th, and 54th; 13th, 32nd, and 46th; 14th and 15th; 16th, 44th, and 56th; 21st, 71st, and 74th; 30th, 40th, 59th, and 82nd; 38th, 64th, 80th, and 98th; 49th, 62nd, 66th, and 99th; 72nd, 78th and 79th.

Expansion of Infantry, 1642-1922. The preceding list gives an impression of the expansion of regular land forces of the Brit. Crown since the reign of Charles II. Of the infantry R.s now forming part of the Brit. Army 3 of the foot guards and 5 of the line R.s served as part of his forces (6 of the Eng. estab. and 2 of the Scottish). A great expansion occurred under James II, who raised 10 R.s of foot, mostly to put down Monmouth's rising. Despite the territorial titles these R.s now bear, their original rank and file were predominantly Irish Catholics. The next large group was that raised by William III for the war in Ireland against James II and the War of the League of Augsburg in the Low Countries, bringing the total of line R.s to 29. The 11 R.s next in seniority were raised at the instance of Marlborough for the wars of Queen Anne's reign.

George I did little to increase the infantry estab. (but see *CAVALRY* article). The War of the Austrian Succession and 'the '45' required, however, the creation of 9 new R.s, while 17 were raised for the long and wearing campaigns of the Seven Years War in N. America and India. Three years after this recruiting for Highland R.s other than the Black Watch began. Eighteen new R.s were formed during the wars of the Fr. Revolution and Empire, but this does not fully represent the expansion that took place at this time, for many second battalions were formed and later disbanded, besides regiments which no longer exist. But certain rifle and light infantry R.s were expanded to 4 battalions and retained this strength until 1922.

During the long peace following Waterloo the total remained at rather less than 100. Only the 3rd battalion of the Rifle Brigade was raised for the Crimea, and the 4th of the same R. for the Indian Mutiny, which led to the last major addition to the list of infantry regiments. Besides native troops, the East India Company had maintained its own Brit. R.s since the reign of Charles II. By

Regiment		497		Regiment	
Horse		Royal Horse Guards		Dragoons	
1	1861			1	1661 Royals
Dragoon Guards					
2	1685	1	1746 King's	2	1678 Scots Greys
3	1685	2	1746 Queen's Bays	3	1685 King's Own
4	1685	3	1746 Prince of Wales's (3/6)*	4	1685 Queen's Own
5	1685	4	1788 (4/7)	5	1685 Disbanded 1799 (Re-raised 1858) as Lancers (5/6th, 1922-27)
6	1685	5	1788 5th Inniskilling Dragoon Guards since 1927	6	1689 5th Inniskilling Dragoon Guards since 1927
7	1685	6	1691 Carabiniers (3/6)	7	1690 Queen's Own
8	1688	7	1788 (4/7)	8	
* 3rd Carabiniers since 1929.					
Light Dragoons		Hussars		Lancers	
3	1818	3	1861		
4	1818	4	1861		
7	1783	7	1805		
8	1775	8	1823		
9	1783			9	1816
10	1780	10	1806		
11	1782	11	1840		
12	1768			12	1816
13	1783	13	1861 (Now 13/18)		
14	1776	14	1861 (Now 14/20)		
15	1766	15	1096 (Now 13/19)		
16	1766			16	1916 (16/5)
17	1759			17	1823 (17/21)
18		18	1858 (Now 13/18)		
19		19	1861 (Now 13/19)	Ex-East India Company's 1st, 2nd, and 3rd European Cavalry	
20		20	1861 (Now 14/21)		
21		21	1861		
				21	1896 (17/21)

In 1957 it was announced that the following additional amalgamation would take place:—1st and the 2nd Dragoon Guards, 3rd and 7th Hussars, 4th and 8th Hussars.

1857 there were 9 of them, 3 for each presidency, and Palmerston's Act for the Better Government of India of 1858 transferred them to the service of the Crown but under their old E. India titles. In 1861 they were finally incorporated in the line and given serial numbers. Twenty years later occurred the reform of 1881, whereby the old system of numbers came to an end and local titles were found for both regular battalions of R.s which sometimes had had little previous connection with the place of their 'adoption.' It was considered that the traditions of the most venerable R.s (down to the 25th Foot) were strong enough to be shared between 2 battalions. See also INFANTRY.

CAVALRY. (See also CAVALRY article.)

The table appearing on p. 497 shows the evolution of Brit. cavalry R.s. The numbers in brackets show the amalgamations of cavalry R.s brought about in 1922. Small numbers show the date of first raising and the date of conversion. The apparently chaotic numbering of cavalry R.s at the present day arises from successive conversions, and comparatively few R.s have disappeared without trace. At the time of the Civil war there were 2 kinds of mounted troops: dragoons, who were organised as infantry and armed with large-bore pistols, and horse, or cavalry proper. Charles II raised 2 mounted R.s, the 1st, or Tangier Horse, and the 2nd, and some troops of dragoons which became the Scots Greys. James II inherited these and raised 6 more R.s of horse and 3 R.s of dragoons, mostly to suppress Monmouth's rebellion. William III converted the Tangier Horse into dragoons and designated them '1st'. He also raised 3 more R.s of dragoons. He named the old 7th Horse the Carabiniers and his own 6th Dragoons the Inniskilling R. In 1746 the R.s of horse with one exception (the 1st, which were the Horse Guards) were redesignated dragoons. In 1759 the first R. of light cavalry was raised—the 17th Light Dragoons. From then until the outbreak of the Fr. Revolutionary War a number of existing dragoons were converted to a light-cavalry role—7th, 8th, 9th, 10th, 11th, 12th, 13th, 14th, 15th, and 16th. There then remained only 12 R.s of heavy cavalry—the 7th dragoon guard R. and the 1st, 2nd, 3rd, 4th, and 6th Dragoons. From 1806 onwards, following the Napoleonic example, the light cavalry was divided into hussars and lancers in the proportion of about 3 to 2. In 1861 some European horse R.s of the disbanded East India Company's army were transferred to the Crown estab. as hussars and lancers (cf. table of cavalry R.s, 19, 20, 21). See ARMY, Organisation; DRAGOONS; DRAGOON GUARDS; GUARDS (HOUSEHOLD TROOPS); HOUSEHOLD CAVALRY; HUSSARS; LANCERS; SCOTTISH REGIMENTS; and separate articles on individual R.s. See also YROMANRY. See Walton, *History of the British Standing Army*, 1894; G. Burgess-Short and H. M. Chichester, *The Records and Badges of every Regiment of the British Army* (2nd

ed.), 1900; Sir J. W. Fortescue, *A History of the British Army*, 1910-30; Sir C. H. Firth, *Cromwell's Regiments*, 1940; A. D. Wilson, *Regiments at a Glance*, 1956; also *Journal of the Society for Army Historical Research*.

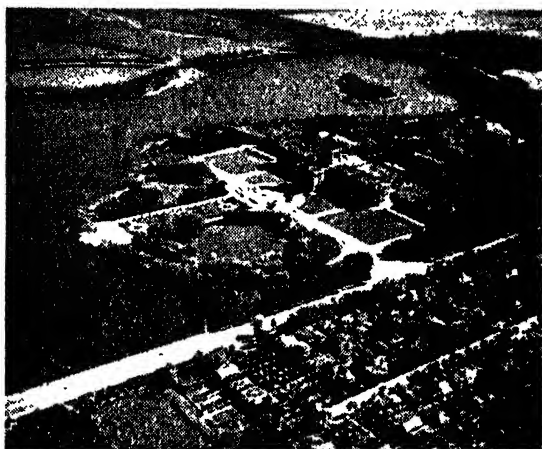
Regimental Marches. In the Brit. Army it is a long-standing custom of regiments to adopt, by authority, a marching tune, to which the regiment marches past at reviews, and concludes a band performance with a quick-step. In many cases the R. M. are old tunes associated with the co. from which the regiment takes its name, such as *The Lincolnshire Poacher*, of the Lincolnshire Regiment, or *D'ye ken John Peel*, of the Border Regiment. Other marching tunes commemorate famous commanders of the past: the Royal Scots, for example, still march past to the old Scottish air *Dumbarton's Drums*, recalling the fact that the regiment was enrolled in 1678 as Dumbarton's Regiment; while the Duke of Wellington's (W. Riding Regiment) marches to the tune of *The Wellesley* commemorating the fact that they were led by Col. Wellesley (later the Duke of Wellington) against Tippee Sahib. One of the most famous of all marching tunes is *Ca Ira*, the Fr. revolutionary air (see CA IRA). The W. Yorkshire Regiment adopted their quick-step from this air at the time of the siege of Famars, in which they took part. Again, the Rifle Brigade's tune, *I'm Ninety-five*, commemorates the fact that before they were taken out of the line to be converted into riflemen they were designated the 95th Foot. There is thus much army hist. in marching tunes, and the different regiments are naturally proud of the distinctive incidents with which they are associated. Among other R. M.s are *The Young May Moon* is beaming (Notts and Derby Regiment); *Hielen' Laddie* (Black Watch and the Scots Guards), a very famous tune; *We'll gang nae mair to von Toon* (Hampshire Regiment—which regiment has also a second march, called the *Hampshire*); *Athol Highlanders* and *Within a Mile of Edinburgh Town* (both of the Cameronians); *Kymegid Slashers* and *Highland Pipers* (both the Gloucestershire Regiment); *Windsor* (Worcestershire Regiment); *Lancashire Lads* (E. Lancashire Regiment); *A Southerly Wind* and *a Cloudy Sky* and *Lass of Gowrie* (both of the E. Surrey Regiment); *One and All* (Duke of Cornwall's Light Infantry); *Men of Harlech* (S. Wales Borderers); *Blue Bonnets over the Border* (King's Own Scottish Borderers), the words of which were written by Sir Walter Scott, the song itself being founded on *General Leslie's March of Longmarston Moor*; *We've Lived and Loved Together* (Devonshire Regiment); *Speed the Plough* (Suffolk Regiment); *Prince Albert's March* (Somerset Light Infantry, the full name of which regiment is Prince Albert's Somerset Light Infantry); *The Yorkshire Lads* (E. Yorkshire Regiment); *Mountain Rose* and *Mandolinata* (both of the Bedfordshire Regiment). It is curious that while

the Scots and Irish regiments adhere to their own national melodies the Eng. regiments draw freely upon Scottish compositions for their R. M.s, e.g. (in addition to instances given above) the tune of the Royal Lancaster Regiment is *Corn Rigs are Bonnie*; that of the Cheshire Regiment is *Wha wouldna' fecht for Charlie?*; that of the Royal W. Kent Regiment is *A Hundred Pipers*, and that of the Durham Light Infantry is *Whistle o'er the Lave o't*. The Durham Light Infantry and the Royal Ulster Rifles both march past to the same air; but whereas the Durham Light Infantry calls it *The Light Barque*, the Royal Ulster Regiment knows it as *Off, Off, said the Stranger*. *Lillibullero*, the Whig political ballad which originated in the Army

Regina, cap. of Saskatchewan, Canada, on the Canadian Pacific Railway, 357 m. from Winnipeg. It was founded in 1882. Early in 1883 it was declared the seat of gov. of the NW. Ters. replacing Battleford, and so remained until 1905, when the Ters. were divided and it became the cap. of the new prov. of Saskatchewan. Named in honour of Queen Victoria, R. is frequently called the 'Queen City.' A singularly handsome centre, with many striking buildings, particularly those of the prov. and federal govts., it stands surrounded by a vast plain of grain fields, with a climate of abundant sunshine. Man-made Wascana Lake and more than 3000 ac. of parks and boulevards contribute to its scenic beauty. It is a popular centre for conventions of

REGINA

Saskatchewan
Legislative
Buildings
and
Wascana
Lake.



National Film
Board, Canada

under James II (perhaps in the 8th Liverpool Regiment), was revived during the Second World War, and adopted by commando units as a regimental march. Some tunes are common to a number of regiments: *The British Grenadiers* is played by all Fusilier regiments as well as by the Grenadier Guards. The cavalry regiments have, as a rule, rather stately compositions of their own. The Scots Greys, however, adopted *The Garb of Auld Gaul*, which properly belongs to the Royal Scots, while *The Duke of York's March* is played by sev. cavalry regiments; and since the amalgamation of cavalry regiments soon after the First World War, there has been a blending of the R. M.s. The R.A.F. march past was composed by Sir Henry Walford Davies. The marches are played mostly on special occasions, chiefly ceremonial, but some regiments play them on the dismissal of a parade, and the particular air is followed immediately by the National Anthem. See W. Wood, *The Romance of Regimental Marches*, 1932.

national and international organizations, while events such as the prov. agric. and industrial exhibition and drama and musical festivals draw many visitors to the city. It is the site of the striking Prov. Museum of Natural Hist. and of the extensive training depot of the Royal Canadian Mounted Police. It has 3 colleges, including a branch of the univ. of Saskatchewan, Regina College, which houses the Norman Mackenzie Art Gallery. The diversified industrial output of the city includes agric. products, petroleum products from large refineries, and such manufs. as cement, cindercrete, paper and boxes, paints and varnishes, farm machinery, furniture, and storage tanks. The city is the H.Q. of the Saskatchewan Wheat Pool, the largest co-operative enterprise in Canada. Pop. (1951) 71,319. See E. G. Drake, *Regina, The Queen City*, 1955.

Régio, José (1901-), pseudonym of the Portuguese poet, dramatist, essayist, and novelist José Maria dos Reis Pereira.

All his work revolves around the baleful significances of existence, man's interpretation of God's designs, and the forebodings and fears in the early days of a lost childhood. See *Poemas de Deus e do Diabo*, 1925; *As Encruzilhadas de Deus*, 1926; *Biografia*, 1929; *Teatro*, 1941-7; *A Velha Casa*, 1945-7.

Regiomontanus (1436-76), Ger. astronomer, whose real name was Johann Müller, b. Königsberg, Franconia. He studied at Vienna, where he met Purbach, and in 1461 accompanied Cardinal Bessarion to Italy. He left Rome in 1468, spending the next 3 years at the court of the King of Hungary, and afterwards settled at Nuremberg, where he pub. his *Tabulae Directionum*, 1475. Bernhard Walther, a wealthy citizen, furnished him with means to start a book-printing business and to construct astronomical instruments, wherewith they demonstrated the inaccuracy of the Alphonsine Tables (q.v.).

Regional Planning, method of planning in advance of development large areas of land, usually under the authority of regional committees estab. by local authorities. The object is to prepare outline plans for such public services as roads and drainage, and to indicate areas for open spaces, rural preservation, industrial and residential development, etc., to which the tn plans adopted by individual local authorities may conform. Many such committees were set up in England after 1920, and a number of reports were issued by them. The whole subject was subsequently examined in its various aspects by the Scott and Barlow Committees, and both before and since the setting up of these committees, there was legislation on the subject of tn and country planning. At first the central departmental authority was the Tn and Country Planning Advisory Committee which was appointed as a dept of the ministry of health, but subsequently a separate ministry of Housing and Local Gov. was created. See further under TOWN AND COUNTRY PLANNING.

Regionalism, term denoting local individualism in politics; also used in literary criticism to describe a type of fiction in which the scene is set in a particular locality, and a realistic presentation of the life and work of the area is given. In Eng. literature the regional novel developed rapidly in the 19th cent. The Brontës laid the scene of their novels in Yorks and George Eliot placed hers in the E. Midlands. Other examples of R. are the 'Barnetshire' novels of Trollope, and the 'Wessex' novels of Hardy. The works of Mary Webb, Sheila Kaye-Smith, Eden Phillpotts, and J. B. Priestley, are often examples of literary R.

Registered Stock, or Inscribed Stock. Stock is said to be inscribed or registered when the name of the stockholder is inscribed in the stock register of the state or corporation issuing it. The holder is entitled to a national sum, usually £100 or multiples thereof and the right to receive a fixed rate of interest in per-

petuity. The registration is evidenced by a certificate which also gives him the right to obtain payments of interest. In contradistinction to R. S. is that stock which is issued in the form of bearer bonds with dividend coupons attached.

Registers, Parish. Registers of a kind appear to have been kept by all civilised peoples in every age. In the Rom. provs. officials were appointed as public registrars to keep records of names for the settlement of disputes, proof of freedom, and certification of births and deaths. In France it appears that registers were kept with surprising regularity from about 1308. P. R. were not regularly kept in England before 1538. From that date, however, until 1837 they form a useful record of the manners, customs, and events of 3 cents. of Eng. social hist. They have often afforded the chief evidence of titles to peerage and property, and are an invaluable source of material for all manner of historical and genealogical research. Although public attention has frequently been called to the importance of securing the safety of P. R., Parliament has never taken effective steps to ensure that this was done. It is on record that some have been sold as waste paper or made into book covers; some at Wimpole, Cambs, were destroyed by parliamentary troops; and those at Otterinton 'were devoted to the utilitarian employment of singeing a goose.' P. R. belong in law to the par. churches. The national records of births, deaths, and marriages have been compiled since 1837, and so less reference is made to P. R. maintained since then. See also REGISTRATION OF BIRTHS, MARRIAGES, AND DEATHS. See J. C. Cox, *Parish Registers of England*, 1910; and T. P. Taswell-Langmead, *Preservation of Parish Registers*.

Registrar: *Bankruptcy*. The R.s in bankruptcy of the high court and co. courts are the officials who hear bankruptcy petitions, make receiving orders, hold public examination of debtors, approve compositions or schemes of arrangement, and grant orders of discharge to bankrupts.

Probate. The R. of a dist. registry grants probate (q.v.) of wills or letters of administration in cases where the deceased appears at the time of his death to have had a fixed place of abode within the dist. in which application for probate is made; but in opposed applications he may only grant probate when the contention is terminated by decree or otherwise. The R. of the Principal Probate Registry (Somerset House) is an official invested with all the authority of a judge in chambers in matters of probate and divorce, except in proceedings touching the liberty of the subject, service of writs out of jurisdiction, injunctions, appeals from dist. registrars, taxation of costs, and other minor matters. The duties of a co. court R. comprise the filling up of the usual papers required by the probate court to lead to a grant of letters of ad-

ministration, and transmission of the same to the R. of the probate court.

Privy Council. To the R. of the Privy Council have been assigned by order in council, 1904, all the duties of the old R. in eccles. and Admiralty causes. He has power to examine witnesses on oath in all actions pending before the Judicial Committee of the Privy Council, and to do the chamber work of that committee, such as issuing the committee's orders and calling on parties to enter an appearance.

Consistory Court. The R. of this court, who is appointed by the bishop of the diocese, prepares faculties, sends to the registrar-general of births, deaths, and marriages a list of all the Church of England chapels of his diocese within which a marriage may be celebrated, and has duties to perform in connection with the issue of marriage licences. *See also* ECCLESIASTICAL COURTS.

Joint-stock Companies. The R. of joint-stock companies registers companies formed under the Companies Act, 1948. He is an officer of the Board of Trade.

County Courts. The R. of a co. court, who must be a solicitor of 7 years' standing, usually hears all cases in which the amount involved is not over £10. He issues summonses, warrants, precepts and writs of execution; registers all orders and judgments of the co. court of which he is the R., and keeps an account of all court fees and fines. He generally performs the duties of a R. in bankruptcy, and in addition performs numerous duties in interlocutory proceedings before the co. court. He must reside within the dist. of his court.

High Court Registrars. The duties of the R.s of the chancery court are to take notes on the judgments and orders of the judges in that court, and the court of appeal in the case of chancery appeals, to make up lists of the causes for trial before the chancery judges, and assist the judges generally during the hearing of cases.

Solicitors' Registrar. The official whose duty it is to issue certificates empowering solicitors to practise.

See also FRIENDLY SOCIETIES.

Registrar General, in England and Wales, the central authority for the registration of births, marriages, and deaths and for the taking of the periodical census. He is also responsible for the preparation of the census returns and vital statistics, derived from the registration and other records. The first R. G. for England and Wales was appointed in 1836. A R. G. is appointed separately in Scotland and in Northern Ireland. *See* next article.

Registration of Births, Marriages, and Deaths. Prior to 1837, the only officially recognised records relating to births, marriages, and deaths were the par. registers (q.v.). In addition, a number of other registers were kept, particularly by Nonconformist churches; many of these were subsequently transferred by Act of Parliament to the Registrar General, who has authority to issue

certified extracts from them. Comprehensive civil registration of births, marriages, and deaths was inaugurated by the Births and Deaths Registration Act, 1836. Sev. Acts modifying and extending the provisions relating to registration were passed between then and 1926. These have now been consolidated, so far as England and Wales are concerned, in the Marriage Act, 1949, the Births and Deaths Registration Act, 1953, and the Registration Service Act, 1953.

The Registrar General, appointed under Act of Parliament, is responsible for the central control of the registration service, which is organised in some 500 registration dists. and over 1200 sub-dists. in England and Wales. The central office, the General Register Office, is situated at Somerset House, Strand, London.

The object of the Registration Acts is primarily to furnish official proof of a birth, marriage, or death, but the information so obtained also forms the basis of statistics to assist the study of medical and pop. problems.

Within 36 hours after the birth of a child, notice must be given to the Dist. Medical Officer of Health. Generally this duty is discharged by the doctor or midwife attending the mother, but if not, the duty devolves on the father of the child or any person who was in attendance upon the mother at the time of the birth. This notification to the Health Authorities must not be confused with the registration of the birth.

Within 42 days after the birth, personal information of it must be given to the registrar of births and deaths for the sub-dist. in which the birth occurred. The duty of giving this information and of signing the birth register rests primarily upon the parents, or failing them on the occupier of the house in which the birth occurred, or a person present at the birth, or the person having charge of the child. In the case of an illegitimate child, the father is not qualified to give information alone, but he can attend with the mother and sign the entry jointly with her. No fee is payable for registering a birth within 3 months after its occurrence; after that time fees become payable, and there are special provisions relating to late registration.

If it is not convenient for the informant to attend before the registrar of the sub-dist. where the birth occurred, it is possible for him to attend before any other registrar to make a written declaration of the particulars to be registered. This declaration will be sent on to the appropriate registrar, who will make an entry in his register accordingly. The charge for this service is 3s.

Provision exists for the re-registration of a birth when a child has become legitimated by virtue of the subsequent marriage of its parents. Application for re-registration in such circumstances must be made to the Registrar General.

A stillbirth must be registered, and a certificate signed by the doctor or midwife

in attendance at the birth or who has examined the body of the child should be produced to the registrar. The persons required to give information about a stillbirth are the same as those for a birth, but there is no provision for attendance before a registrar other than the one for the sub-dist. where the birth occurred.

When a child is adopted in Court, an entry is made in the Adopted Children Register maintained by the Registrar General. Certificates are obtainable from this register in the same way as from birth registers (see below).

Every death which takes place must be registered by the registrar of the sub-dist. in which the death occurred. Unless a coroner's inquest has been held, personal information for the registration must be given by a qualified informant. Qualified informants include relatives, any person present at the death, the occupier or an inmate of the house where the death occurred, or the person responsible for the arrangements for burial or cremation. Registration must take place within 5 days, but this period is extended to 14 days if written notice of the death has been sent to the registrar. If the deceased was attended during his last illness by a registered medical practitioner, it is that doctor's duty to send to the registrar a certificate of the cause of death, and to give to a qualified informant a notice that he has done so. This notice should be handed to the registrar by the informant when he registers the death. Registration of a death is free of charge. When an inquest is held, the coroner sends a document to the registrar from which the death entry is made.

A body must not be buried or cremated until an authority has been issued by the coroner or the registrar. If a death is being investigated by a coroner, a registrar cannot issue any authority for disposal until those investigations have been completed. A document issued by a coroner or registrar is not in itself sufficient authority for cremation; final authority must be given by a medical referee at the crematorium.

Marriages are registered by clergymen, registrars, secretaries of synagogues, and so on, according to the place in which the marriage takes place.

Since copies of all entries made in registers of births, deaths, and marriages are sent to the General Register Office at Somerset House, certificates from these entries can be obtained either from the person having custody of the original register or from the Registrar General. The fee for a certificate of death or marriage is 3s. 9d. The fee for a full birth certificate is also 3s. 9d., but a short certificate prepared from a birth entry or from the Adopted Children Register costs only 9d. The short certificate gives no information of parentage, but states only the name, sex, date, and place of birth of the person concerned. Short certificates are now in general use throughout the country, and are acceptable on almost all occasions when a person needs

to prove his age. Where a search is necessary to trace an entry, a search fee is normally charged: this fee is 1s. 6d. if personal application is made, or 3s. 9d. if application is made by post and the search is made on the applicant's behalf. *See also CENSUS; VITAL STATISTICS.*

Registration of Deeds, or Enrolment, is necessary in certain cases and for certain purposes, e.g. in register cos. (*see REGISTRATION OF TITLE*); in the case of gifts to charities (*see MORTMAIN AND CHARITIES*); barring all entail (*see ENTAIL AND ESTATE*); bargain and sale of freeholds (*i.e.* under the Statute of Enrolments of 1535, which was aimed at secret conveyances), a mode of conveyance which was superseded by a simple release in 1841, which mode was in its turn replaced by a mere deed of grant (*see GRANT*); and in the case of certain rent-charges. A rent-charge created otherwise than by will or marriage-settlement must, since the passing of the Judgments Act, 1855, be registered; by that Act the registration was effected in the Central Office; but by the Land Charges Act, 1900, the registration must be in the Land Registry. Unless registered a rent-charge cannot prevail against subsequent purchasers or creditors without notice (*see NOTICE, EQUITABLE AND JUDICIAL*), though it will prevail against the trustee in bankruptcy of the owner of the rent-charge. *See also LAND LAWS.*

Registration of Title. The official Land Registry was estab., as the result of a recommendation of a royal commission, by an Act passed in 1862. The purpose of the Act was to simplify and lessen the cost of dealings in land by establishing a state register of landowners who voluntarily submitted the titles to their land for examination and approval by the registrar on behalf of the State. The registry was reformed by the Land Transfer Act, 1875, which, however, continued the voluntary basis of the system. The Land Transfer Act of 1897 introduced the principle of compulsory registration, and various orders in council under that Act between 1898 and 1902 made the system compulsory on sale in the administrative co. of London. By further orders of more recent years registration has been made compulsory in certain prov. tns and in the administrative cos. of Middx and Surrey. The Land Registration Act, 1925, consolidated the previous Acts, incorporating such changes as experience had shown to be necessary. The system shows that the machinery for the purchases and sale of land is assimilated to that for stocks and shares. Simple forms, analogous to those used on transfers of stocks and shares, are provided. The cost of buying, selling, or mortgaging registered land is much less than the cost in the case of unregistered land. It is open to any co. council or council of a co. bor. to apply to the Privy Council for an order making registration of title compulsory in its area.

Titles may be officially examined and registered as: (1) absolute, (2) qualified,

and (3) possessory. An absolute title is one that cannot be disputed, it being good against all the world, except registered encumbrancers and beneficiaries with trustees. An absolute title, granted by the Land Registry, is guaranteed by the State. A qualified title is one that is subject to other estates or interest actually specified in the register. A possessory or 'holding' title is subject to all adverse or derogatory estates (if any), but it can be converted into an absolute title at any time if the registrar thinks fit. So to convert a possessory title, the registrar must investigate the title and advertise for possible objectors to lodge their objections within 2 months. A possessory title 6 years old is comparatively easy of conversion into an absolute title. The 'register' at the Land Registry consists of 3 divs.: (1) the property register, in which are registered particulars and situation of land, and rights, etc., appertaining thereto; (2) proprietorship register, which specifies the nature of the title; and (3) the charges register, which states the encumbrances on registered lands. A registered proprietor may convey in the usual way (see CONVEYANCE; CONVEYANCING), or may make use of a short form prescribed by the Land Transfer Rules, the transfer being entered on the register, and a document called a land-certificate being delivered to the purchaser or transferee, and, on part-sale, to the transferor or vendor also. Apart from conveyances of freehold, which must, in a compulsory area, always be registered, all assignments of leaseholds for an unexpired residue of not less than 40 years must be registered, as also all leases and under-leases granted for a like period. The fees payable for registration vary from 6d., where the value of the consideration for the sale does not exceed £5, to £1 13s., where the value exceeds £275 but does not exceed £300, an additional 5s. being payable for each £60 over £300. The Land Registry is in Lincoln's Inn Fields, London.

Registration of Voters, see ELECTIONS.

Regium Donum, sum of £1200 per annum granted by William III to the Presbyterian Church of Ireland in consideration of the active aid given him against James II. It was finally abolished in 1871, compensation being granted to those ministers who had a claim on the fund. This grant was paid also to the Eng. Nonconformist clergy from 1721. Later the Nonconformists themselves objected to this form of state aid, and it was withdrawn in 1857.

Regius Professor, holder of a univ. professorship founded by a king. In 1546 Henry VIII founded chairs of Hebrew, Greek, divinity, medicine, and civil law at Oxford, and chairs of Greek, Hebrew, divinity, hist., civil law, and physics at Cambridge. The chair of modern hist. at Oxford was founded by George I in 1724.

Regnal Year, Brit. method of dating Acts of Parliament. A sovereign's R. Y. begins on the anniversary of his accession, e.g. R. Y. 1. of King George VI commenced on 12 Dec. 1936. Acts passed

in a calendar year containing more than one R. Y. are dated by all, e.g. legislation of 1910 is dated 10 Edward VII and 1 George V. See also ACT (ACT OF PARLIAMENT).

Regnard, Jean François (1655-1709), Fr. dramatist, b. Paris of wealthy middle-class parents. In 1678, while on his way from Italy to France, he was captured by corsairs and kept as a slave in Algiers, an experience which he describes in his novel, *La Provençale*, 1731. Later he travelled very widely, and it was not until 1696 that he produced his first great comedy, *Le Joueur*, at the Théâtre Français, followed by *Le Distrait*, 1697, *Démocrile*, 1700, *Les Folies amoureuses*, 1704, *Les Ménechmes*, 1705, and his masterpiece, *Le Légataire universel*, 1708, which gave him rank as second only to Molière, though his work lacked the depth which made Molière's so outstanding. An ed. of his works was pub. in 6 vols., 1819-20. See F. Gailfe, *Le Drame en France au XVIII^{ème} siècle*, 1910.

Regnault, Henri (1843-71), Fr. painter, b. Paris. He travelled in Italy, Spain, Morocco, and painted, besides portraits, scenes from oriental life and subjects inspired by episodes in Fr. hist., particularly of a martial character. He was killed on the battlefield. See lives by H. Cazalis, 1872, and R. Marx, 1886.

Regnault, Henri Victor (1810-78), Fr. chemist and physicist, b. Aix-la-Chapelle. He studied chem. under Liebig, became a prof. at Lyons, and in 1841 prof. of physics at the Collège de France. His discoveries in organic chem. won him election to the Academy of Sciences, and he became director of the Imperial porcelain manufactory of Sèvres. R. is famed for his researches in connection with specific heat and expansion of gases. He wrote largely on chemical and physical subjects, chiefly for scientific periodicals. See A. Dumas, *Éloge historique de Henri Victor Regnault*, 1881.

Régnier Henri François Joseph de (1864-1936), Fr. poet and novelist, b. Honfleur (Calvados). He studied law in Paris. In the eighties R. appeared as a symbolist poet, beginning with *Les Lendemains*, 1885. Other vols. were *Les Médailles d'argiles*, 1900, and *Vestigia flammæ*, 1921. His novels include *La Canne de Jaspe*, 1895, *La Double Maîtresse*, 1900, *Les Vacances d'un jeune homme sage*, 1903, *La Peur de l'amour*, 1907, *L'Amphisbène*, 1912, *L'Illusion héroïque de Tito Bossi*, 1916, *La Pécheresse*, 1920, *L'Escapade*, 1926, and *L'Altana ou la vie vénitienne*, 1929. He was elected to the Fr. Academy in 1911. His collected works were pub. 1921-31. See study by R. Homert, 1923.

Régnier, Mathurin (1573-1613), Fr. poet, b. Chartres. He took holy orders, and eventually was made a canon of Chartres Cathedral. He led a gay and dissipated life. His works, 1608-12, chiefly satires, are characterised by the absence of personal reference, by acute observation, and by their caustic wit and easy style. They have been collected and

ed. by E. Courbet, 1875, and J. Plattard, 1930. See study by J. Vianey, 1896.

Regnitz, riv. of Bavaria (q.v.), which joins the Main (q.v.) near Bamberg (q.v.). In its lower course it forms part of the Ludwigskanal, connecting the Main and the Danube (q.v.). Length 130 m.

Regular Canons, see CANON.

Regulation, form of delegated, subsidiary, or secondary legislation, which may be exercised by gov. depts directly under the authority of a statute, or indirectly under like authority. There is little, if any, substantial difference between rules and R.s, special orders, and orders. There is a vague departmental understanding that rules and R.s are intended to be of general application throughout the kingdom, whereas orders (prerogative orders and statutory orders) are of limited application to specific places, persons, or classes of persons, e.g. Housing Orders or Tn Planning Orders. The distinction, however, is not uniform. Thus, under the Poor Law Acts and some of the earlier Housing Acts, the dept concerned made 'orders' of universal application, and under the Public Health Act, 1875, power was given to make regulations regarding infectious diseases, but orders with regard to the qualifications and duties of medical officers of health. The inconvenience in practice is one of form rather than of substance. Both, however, are challengeable in the courts, though whether for a specified period or at all times is not clear. Both the Defence of the Realm Act, 1914, and the Emergency Powers Act, 1939, endowed the executive with the necessary authority to issue R.s for the purpose, or better realisation of the purpose, of ordering the detention of dangerous persons in wartime. In the course of both world wars the action of the executive was unsuccessfully called in question before the House of Lords, in 1917 in the case of *Zadig*, and in 1941 in the case of *Liversedge v. Anderson*. See H. G. Hanbury, *English Courts of Law*, 1944, and C. K. Allen, *Law and Orders*, 1945.

Regulus, Marcus Atilius, Rom. consul 267 bc. In 256 he was consul a second time with Lucius Manlius Vulso Longus. The 2 consuls defeated the Carthaginian fleet, and afterwards landed in Africa with a large force. They first met with success, but in 255 R. was defeated and taken prisoner. Five years later the Carthaginians sent an embassy to Rome to solicit peace. They allowed R. to accompany the ambas. on the promise that he would return to Carthage if their proposals were declined. He dissuaded the senate from assenting to a peace, returned to Carthage, and was said to have been put to death with torture (250).

Regulus, see GOLDEN-CRESTED WREN.

Regulus (metallurgical), see MATTE.

Regulus (star), see LEO.

Rehoboam ('the people is enlarged,' 1 Kings xii, xiv), son of Solomon and Naamah, an Ammonite princess. R. ascended the throne c. 930 bc at the age of 41, and reigned 17 years. Discontent

had been excited by the high taxation and forced labour imposed during his father's reign. The N. tribes probably had resolved to break away whatever happened. They had already recalled Jeroboam (q.v.) from exile in Egypt, to lead a deputation to R. to demand relief. R., however, gave a most insolent and tyrannical reply, whereupon the N. tribes drew off in resentment, stoned the officer, Adoram (Adonoram), sent to make terms with them, and made Jeroboam their king. Thus the national union was dissolved; only Judah and Benjamin remained loyal to the dynasty of David.

Rehoboth, dist. and tn of SW. Africa. The pop. of the dist., called the Bastards, are half-caste Hottentot-Europeans. Since 1924 the dist. has been governed by the Bastard Administration; previously it had native government. Cattle-breeding is carried on and gold is mined. Pop. (dist.) 5000.

Reichenau: 1. Austrian tn in the prov. of Lower Austria, in the Schwarza valley, near the Semmering (q.v.). It is a popular summer and winter resort. Pop. 5000.

2. Ger. is. in the Land of Baden-Württemberg (q.v.). It is in Lake Constance (q.v.) and is connected by causeway with the mainland. R. contains 3 small vils., Oberzell, Mittelzell, and Unterzell. Its steep, rugged coast-line made it an easy position to defend, and it became a Benedictine monastic settlement in Carolingian times. With Fulda and St Gall (qq.v.), it was one of the most important centres of Ger. culture in the early Middle Ages. The minster of SS. Mary and Mark, in Mittelzell, founded in 813, contains much 10th- and 11th-cent. work, while the series of frescoes in St George's Church, in Oberzell, which belong to the same period, are among the finest in Europe. The monks of R. were famous for their illuminated MSS., which derived some of their inspiration from St Gall but show, like the rest of R.'s art, distinctive traces of Byzantine influence. Pop. 3000. See K. Gröber, *Reichenauer Kunst*, 1922; W. Gernsheim, *Die Buchmalerei der Reichenau*, 1936; and K. Beyerle, *Bischof Perminius und die Gründung der Abtei Murbach und Reichenau*, 1947.

Reichenbach, Karl, Baron von (1788-1869), Ger. scientist, b. Stuttgart. The first iron foundries and charcoal furnaces in Bavaria were estab. by R., who discovered paraffin in 1830 and creosote 2 years later. He also studied animal magnetism.

Reichenbach: 1. Ger. tn in the dist. of Karl-Marx-Stadt, 30 m. SW. by W. of Karl-Marx-Stadt (q.v.), at the foot of the Erzgebirge. It has an important textile industry, and manufs. of machinery and ceramics. Pop. 38,000.

2. See DZIERZONIÓW.

3. Riv. in the canton of Bern, Switzerland, having its source in the Great Scheidegg. Its confluence with the Aar is opposite Meiringen. Its course is interrupted by waterfalls, in some cases hundreds of feet in descent.

Reichenberg, see LIBEREC.

Reichenhall, Bad, Ger. spa in the *Land* of Bavaria, 67 m. ESE. of Munich (q.v.). It is in a wooded dist. of the Alps (q.v.), near the Austrian border. Salt has been produced from its springs since Celtic times; the salt trade of it was important to the Romans, and in the Middle Ages it was the foundation of the prosperity of many tns (see MUNICH). The tn is much frequented as a health and sports resort. Pop. 14,000.

Reichsbank, see BANKING IN GERMANY.

Reichsrat, from 1919 to 1945 Ger. federal chamber, representing the states. It replaced Bismarck's *Bundesrat*, but held less power, its functions being largely advisory. The word has also been used, at different times, of various constitutional bodies in Denmark, Sweden, tsarist Russia, the Austrian Empire, and Bavaria.

Reichstadt, Duke of, see NAPOLEON II.

Reichstag (Ger. 'Diet of the Empire'), former name for the Ger. legislature, derived from informal, intermittent meetings of nobles and estates called for a specific day, first by Frankish rulers and then by Ger. emperors. In 1867 the R. was re-estab. as an elected parliament for the N. Ger. Confederation, and in 1871, for the Ger. Empire. It exercised legislative power with the *Bundesrat* (q.v.), under the emperor's prerogatives. In 1919 the R. gained supreme power. It was elected by universal suffrage under a system of proportional representation. The *Bundesrat* had disappeared, and its successor, the *Reichsrat* (q.v.), exercised only curtailed powers. The National Socialist regime preserved the R. in name, but Hitler eliminated opposition from that elected in 1933, and for later elections only names of National Socialists were submitted. Nominated members of the R. were added occasionally to represent annexed ters. By passing the *Enabling Act* (1933) the R. voted its own virtual elimination. After this it was convened only to hear declarations of national policy made from time to time by Hitler, though it was supposed to have advisory functions.

In 1949 representative government, under Brit., Amer., and Fr. supervision, was restored in W. Germany, and elections were held. This legislature, however, was called the *Bundestag* (q.v.). See also under GERMANY, *History*.

Reichstag Fire, see under GERMANY, *History*.

Reid, Sir George (1841-1913), artist, b. Aberdeen, studied in Paris and Utrecht, and in 1872 worked with Josef Israëls at The Hague. He painted landscapes, e.g. 'Whins in Bloom,' and flower-pieces, but his forte was portraits, including those of George Macdonald, Sir John Millais, James Anthony Froude, the Marquess of Tweeddale, and Sir Wm Henderson. He was president of the Royal Scottish Academy, 1891-1902.

Reid, Sir George Houston (1845-1918), Anglo-Australian politician and for many years high commissioner in London for

Australia, b. Renfrewshire, Scotland, and emigrated to Australia in 1852. He became Premier of New S. Wales and later Premier of the Federal Parliament. As leader of the opposition in the first session of the Commonwealth Parliament he soon became at home on the side of the Ministerialists. He was the pioneer in Australia of the taxation of land values. After his retirement from the office of high commissioner he was elected in 1916 as an Imperialist for St George's, Hanover Square. He was created G.C.B. He enjoyed an imperial reputation and a rare record of achievement in the service of the motherland and the overseas dominions which entitle him to a high place among the makers of the modern Brit. Commonwealth of Nations. See his *My Reminiscences*, 1917.

Reid, Mayne, originally **Thomas Mayne Reid** (1818-83), novelist, b. Ballyroney, N. Ireland. In 1840 he emigrated to the U.S.A. There he had an adventurous and varied career. He was at one time a journalist, but in 1846 he obtained a commission in the New York volunteers, and took an active and distinguished part in the Mexican war. He wrote in 1848 his first novel, *The Rifle Rangers*, which he pub. after his arrival in London 2 years later. He wrote a succession of tales of adventure which were long popular with boy readers, among them *The Scalp Hunters*, 1851, *The White Chief*, 1859, and *The Headless Horseman*, 1866.

Reid, Sir Robert, see LOREBURN, EARL. **Reid, Thomas** (1710-96), philosopher, b. Strachan. He graduated from Marischal College, Aberdeen, in 1726, and in 1733-6 acted as college librarian. In 1737 he was presented to the living of New Machar, near Aberdeen, and having turned his attention to philosophy, accepted the chair in that faculty at Marischal College in 1751. While there he pub. his *Inquiry into the Human Mind on the Principles of Commonsense* 1762, as an answer to Hume, and in 1764 was appointed prof. of moral philosophy at Glasgow, succeeding Adam Smith. Here he remained till his death, but he retired from the active duties of his professorship in 1780. His essays on the *Intellectual Powers of Man* appeared in 1785, and their ethical complement—the essays on the *Active Powers of the Human Mind*—in 1788. He also wrote an account of Aristotle's *Logic* for Kames's *Sketches of the History of Man*. R. is the leading representative of the school of common sense, by which phrase he meant the beliefs common to rational beings as such, and not vulgar opinion. His most important doctrine is contained in his *Inquiry*, viz. that belief in an external world is intuitive or immediate. See A. S. Pringle Pattison, *Scottish Philosophy*, 1885; A. C. Fraser, *Reid*, 1898.

Reid, Whitelaw (1837-1912), journalist and diplomat, b. Xenia, Ohio. In 1868 he became leading editorial writer for the *New York Tribune*, and in 1872 prin. proprietor and editor-in-chief. He served as minister to France, 1889-92, and in

1897 was special ambas. to England for Queen Victoria's Jubilee, again acting in that capacity at the coronation of King Edward VII, 1902. He was Amer. ambas. to England from 1905 to 1912. He wrote *After the War: a Southern Tour*, 1866, *Ohio in the War*, 1868, *Problems of Expansion*, 1900, *The Greatest Fact in Modern History*, 1906, *The Scot in America and the Ulster Scot*, 1912, and *American and English Studies*, 1913.

Reigate, municipal bor. of Surrey, England, 20 m. from London, comprising Redhill, Merstham, and R., a residential area at the foot of the N. Downs. R. grew up under the shadow of the castle, now destroyed, an early stronghold of the de Warennes, and later of the Earls of Arundel. Places of interest include the Castle Grounds and caves, R. priory and park (now used as a school and open space), the par. church (burial place of Lord Howard of Effingham), and the Old Town Hall, formerly a mrlt house and now a public library. There are a fuller's earth works and hearthstone mines. Pop. 45,500.

Reign of Terror (1793), see FRANCE, History.

Reimarus, Hermann Samuel (1694-1768), Ger. naturalist, philosopher, and Protestant theologian, b. Hamburg; elected rector of the school at Wismar, 1723 and prof. of Hebrew and mathematics at the gymnasium of Hamburg, 1728. Among his works are *Vernunftlehre als Anweisung zum richtigen Gebrauche der Vernunft*, 1756, *Vornehmste Wahrheiten der natürlichen Religion*, 1754, and *the Wolfenbütteler Fragmente eines Unbekannten*, which denied the supernatural origin of Christianity and created a sensation when published by Lessing in 1777. See monographs by D. F. Strauss, 1877, and W. Büttner, 1909; and A. C. Lundsteen, *H. S. Reimarus und die Anfänge der Leben-Jesu-Forschung*, 1939.

Reims, or Rheims (anc. Durocortorum), Fr. city, cap. of an arron., in the dept of Marne, on the r. b. of the Vesle, a trib. of the Aisne. It was one of the prin. tns of Rom. Gaul, and has been an archbishopric since the 4th cent. Here Clovis I (q.v.) was baptised in 496 by St Remi, or Remigius (q.v.), with which event originated the custom of crowning the kings of France at R. There were meetings here between Pope Stephen III and Pépin the Short, and between Pope Leo III and Charlemagne (qq.v.). In the 10th cent. R. was an intellectual centre, and in 1139 the tn was granted a communal charter by Louis VII. Here, in 1429, Charles VII (q.v.) was crowned at the instance of Joan of Arc. Napoleon was victorious in an engagement with the allies here in Mar. 1814. The tn was taken by the Germans during the Franco-Ger. War (q.v.). In the First World War it fell into the hands of the Germans, but it was soon evacuated by them. It was under continual bombardment from 1914 to 1918 and was devastated, but was rebuilt after the war. In the Second World War it was again damaged. On

7 May 1945, at his H.Q. in the tn, Gen. Eisenhower (q.v.) received the unconditional surrender of the Ger. High Command, at the hands of Gen. Jodl. The chief glory of the tn is the magnificent Gothic cathedral of Notre-Dame, begun in 1211, the W. façade of which is one of the masterpieces of the Middle Ages. It was gravely damaged in the First World War, but has been gradually restored. The anc. abbey church of St-Remi was also badly damaged. R. was the bp. of Colbert, Nanteuil, and Drouet d'Erlon (qq.v.). The Gobelins family (q.v.) also belonged to R. R., with Epernay, is a centre for the marketing of Champagne wines. It has chemical, mechanical, metallurgical, textile, and foodstuff manufs. Pop. 110,700.

Reinach, Joseph (1856-1921), Fr.-Jewish politician and historian; he was b. in Paris and became a barrister. He joined the *Republique française* and supported Gambetta, to whom he became a secretary in 1881. In 1889 he became a member of the Chamber, in which he sat at intervals till 1914. R. was a champion of Dreyfus, being one of those mainly responsible in securing justice for him. His account of the case (1901-11) in the *History of the Dreyfus Case* (7 vols.), is an interesting work, though strongly partisan.

Reinach, Eduard (1892-), Ger. poet, b. Strasburg. Many of his subjects are taken from legend and myth, and his lyrics of Alsace show a deep knowledge and love of the old Alsatian customs, traditions, and folklore. R.'s poetry is mystical, pictorial, emotional; he belongs to the school of the late Ger. Romantic poets. His finest pubs. include *Elsässer Idyllen und Elegien*, 1925, and *Süßespäne*, 1930. He also wrote a humorous novel *Bohème in Kustans*, 1929.

Reincarnation, or Metempsychosis, doctrine according to which the soul of a human being enters after death into another body, whether of man or beast. It is impossible to determine where the idea of R. originated, but it certainly dates from the remotest antiquity. It enters into many of the religious and philosophical systems of the E., and is associated with the idea of retribution for good and evil. It probably arose in the attempt to find a cure for evil, and an explanation. If the cure is to be found in a future immortality, the cause may be sought in previous existence whose sins are punished by present suffering. Thus, the goal of all systems which admit R. is the termination of the continuous cycle of rebirth and absorption in the divine. In the W., although the belief was widespread among the ancients, R. appears to have had no spontaneous and popular origin, being rather a tenet of philosophical or mystical schools. It was a central belief of the Pythagoreans and Orphics, derived by them ultimately perhaps from Egypt or Chaldaea. It passed into Platonism, and traces of it appear in the mixed eschatology of Virgil. R. is irreconcilable with Christian theology, and

has no place in the Bible, O.T. or N.T., although some scholars have detected its influence (inherited from Babylonia) in the post-exilic literature of the Jews. See also BUDDHISM; ESCHATOLOGY; HINDUISM; NIRVANA; KARMA; THEOSOPHY. See E. Abel, *Fragmenta Orphica*, 1885; J. Harrison, *Prolegomena to the Study of Greek Religion*, 1903; and W. Lutoslawski, *Pre-existence and Reincarnation*, 1928.

Reindeer, lake in Saskatchewan, Canada, 120 m. long by 25 m. broad; it has an outlet through the Reindeer R. to Churchill R.

Reindeer, or *Rangifer tarandus*, species of deer, the only one which has been domesticated. The domesticated animal is much smaller than the wild. Antlers

summer they feed on coarse grasses, herbs, mosses, and lichens; in winter a special lichen known as R. moss (q.v.) forms their prin. food. Their range was formerly very extensive and in the Post-Glacial Pleistocene period they were abundant in S. France. They are now confined to the most northerly regions of Europe and Asia, in many parts of which, including Norway, the wild herds are stalked. It is still unsettled whether the N. Amer. and Newfoundland caribous are distinct species or only varieties of the R. The barren-ground caribou makes very extensive migrations in huge herds and penetrates far into the Arctic Circle. The woodland caribou occurs in some of the denser Canadian forests and in a few forests of the U.S.A. The Newfound-



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LAPPS ON THE MOVE

are produced in both sexes, being cast in Mar. or early April; those of the female are shorter and more slender. The hoofs are broad and rounded, and the 'pettitoes,' which in other deer except elk are small and evanescent, are well developed, being of great service to the animal in walking over snow and boggy ground. The colour varies considerably, but is commonly a mouse grey tinged with brown, becoming lighter towards winter, with white on the belly, and in the bucks a thick fringe under the throat and neck. The domestication of R.s dates from a remote period, and the Laplanders utilise them not only as beasts of burden, which will drag a sleigh weighing 300 lb. 100 m. a day over the snow, but also to produce milk, meat, clothing, and tents. In domestication they suffer a great deal from anthrax and also from the attacks of flies, which often destroy the value of the skin. They are capable of great endurance, and can swim long distances in ice-cold water; their sense of smell is unusually acute. In

land caribou has been much massacred in the past, but is now protected. See also LAPLAND.

Reindeer Moss, see CLADONIA.

Reinforced Concrete was invented in France about the year 1850, and is now one of the most important materials used in building construction. It is a combination of cement concrete (which can resist very high compressive forces, but has little resistance to the tensile, shearing, twisting, and other forces to which the parts of a structure are subjected) and steel, which has a high resistance to tensile and other forces imposed on structures by their own weight, by the loads they carry, and by other forces, such as the wind. R. C. is designed so that, generally, all the compressive forces are resisted by the concrete and all the other forces by the steel reinforcement. The reinforcement is generally in the form of mild steel round bars up to 2 in. in diameter, but square, indented, and twisted bars, and also high-tensile steel bars, are used. An

advantage of the steel reinforcement is that it also resists the tensile stresses induced in the concrete when the latter shrinks during the setting and hardening process. Another is that concrete and steel expand and contract at the same rate with changes of temp. A further advantage of R. C. is its resistance to fire. The use of reinforcement has made possible the erection of large cantilevers, thin domes, long spans (the longest arch span so far built in R. C. is in a bridge in Sweden and is 865 ft long), and other shapes that would be impossible or uneconomical in any other material. It has also made possible R. C. beams, transmission-line poles, lamp and fence posts, and many other products which can be made in a factory away from the site of erection, with a consequent reduction of the amount of labour required on the site.

Prestressed Concrete.—A more recent development, which was first conceived on the Continent in the first decade of the present century, is known as prestressed concrete, the use of which is making rapid progress. It has been stated that concrete is weak in tension, that is, in its resistance to forces that tend to stretch it; if a beam, say, is loaded at mid span tensile stresses will be induced in its underside because when a beam is bent its underside is lengthened, and its top shortened. If, however, pressure is applied in one or both ends of the beam so that it is in compression throughout its length it will have a greater resistance to bending, and a friable material, or even separate pieces arranged to form a beam, will then carry a load. This can be proved by arranging half a dozen bricks in a row and lifting them by pressing with the hands on the end bricks. Steel, on the other hand, can be stretched and lengthened within its elastic limit, and when the stretching force is removed it will return to its original length. These properties are taken advantage of in prestressed concrete by incorporating in the concrete steel wires (generally about $\frac{1}{4}$ in. in diameter) which are stretched and kept in a state of tension throughout the life of the beam. One method is to place the wires in a mould and stretch them with a jack, fix the ends of the wires so that they remain in the stretched state when the jack is removed, and then place the concrete. In a week or so the bond between the hardened concrete and the steel is sufficient to prevent the wires from slipping, and when the fixings are removed the concrete remains in a state of compression because the wires are striving to regain their original shorter length. In another method longitudinal holes are formed in the concrete to take the wires, which are not in contact with the concrete. Instead they are, after stretching, wedged in steel plates covering the ends of the beam, so that the wires pull on the end plates, and so keep the concrete in compression. See G. Magnel, *Prestressed Concrete*, 1948; A. L. L. Baker, *Reinforced Concrete*, 1949; and Oscar Faber, *Reinforced Concrete Simply Explained*, 1951. See also CONCRETE.

Reinhardt, Max (1873-1943), Austrian-born Amer. theatrical director, b. Baden, near Vienna, of Jewish stock, his real name being Goldmann. He became a bank clerk, but in 1894 appeared on the stage of the Deutsches Theater, Berlin, of which he became director. His character acting was outstanding, but it is as a theatrical manager that he is remembered. He employed the 'apron stage' and other devices to establish intimacy with the audience. His productions of Shakespeare and Shaw, Molière, Strindberg, Ibsen, Gorky, etc., led to his being invited to stage these authors in foreign cities. His theatre became a clearing-house for ideas and tendencies from every country. His most remarkable experiment was *The Miracle*, a medieval pageant enacted with a background which took in both audience and players—an experiment which was followed at Covent Garden in the presentation of *Oedipus Rex*, in which frenzied torch-bearers ran through the auditorium to the great brazen door of the palace. In *Sumurun*, a play without words, the plot was conveyed by music, costume, lighting, and decoration. R. left Germany in 1933, and supervised an open-air production of *A Midsummer Night's Dream* at Oxford, where the honorary degree of D.C.L. was conferred upon him. He went to the U.S.A. in 1935 and became an Amer. citizen in 1940.

Reinkens, Joseph Hubert (1821-96), first Old Catholic bishop, b. Burtscheid, near Aachen. In 1870 he joined Döllinger in the Old Catholic movement and opposition to the doctrine of papal infallibility, and in 1873 was consecrated bishop of the Old Catholics (q.v.) in Germany, with H.Q. at Bonn. See life by J. M. Reinkens, 1906.

Reinsurance. When an insurer has accepted a risk which might involve the payment of an amount too large to be carried by the insurer alone, the risk is spread by reinsuring part of it with other insurers. These other insurers can be either those transacting direct business or companies formed for the sole purpose of underwriting R.s. R. is mainly of 2 kinds:

(1) *Facultative*. Each risk is offered separately to the reinsurer, who has the power to accept or decline according to his own experience.

(2) *Treaty*. This covers a given period during which the reinsurer is bound to accept an agreed proportion of the risks undertaken by the direct insurer. Another form is the *Excess of Loss Treaty*, under which the reinsurer would be liable for all claims in excess of a stated amount.

Reis, Ricardo, see PRASSO, FERNANDO.

Reiske, Johann Jakob (1716-74), German philologist and Oriental scholar, b. Zorkig, Prussian Saxony. In 1758 he was appointed Rector of the Nikolai Gymnasium in Leipzig, after which he turned from the study of Arabic to Gk literature. He pub. a Latin translation

of the *Annales Moslemici* of Abulfeda, 1754, *Animadversiones in Graecos Auctores*, 1757-86, and editions of Theocritus, 1765-6, of the Gk orators, 1770-5, of Dionysius, 1774, and of Plutarch, 1774-82.

Reith, Sir John Charles Walsham, first Baron Reith of Stonehaven (1889-), administrator, b. Stonehaven, and educ. at Gresham's School, Holt, and at the Royal Technical College, Glasgow. He became the first general manager of the B.B.C. in 1922, and was its director-general from 1927 to 1938. In 1947 a series of ann. broadcast lectures was estab., named after R. He left the B.B.C. to become chairman of Imperial Airways, and was the first chairman of the Brit. Overseas Airways Corporation. R. became M.P. for Southampton in 1940 and was successively minister of information, minister of transport, and minister of works and buildings. In 1945 he became chairman of the Commonwealth Telecommunications Conference, and from 1946 to 1950 was chairman of the Commonwealth Telecommunications Board, and of the National Film Finance Corporation from 1948 to 1951. He was knighted in 1927 and created a peer in 1940. He pub. a book of memoirs in 1948 and an autobiography, *Into the Wind*, in 1950.

Reitz, Deneys (1882-1944), S. African soldier, politician, and author, b. Bloemfontein, son of the president of the Orange Free State at the outbreak of the S. African war. He fought against Britain in that war and afterwards went into voluntary exile in Madagascar, but was induced by Gen. Smuts to go back to S. Africa, where he qualified in law. After his return he forsook his anti-Brit. attitude, and in the First World War he fought with the Union forces in Ger. E. and W. Africa; volunteered for service with the Brit. forces in 1917 and took a commission, being severely wounded and mentioned in dispatches. In 1920 he was elected to the Union Parliament as a member of the S. African party. He was minister of lands (when he was influential in the development of the Kruger National Park), 1933; minister of agriculture and forestry, 1935; minister of mines, 1938; and in 1939, after the Smuts-Hertzog break on the war issue, became deputy Prime Minister (till 1943) and minister for native affairs. In 1942 he was appointed S. African high commissioner in London. He did much for Afrikaans as a literary language and wrote, among other books, *Commando: a Boer Journal of the Boer War*, 1929, *Trekking On*, 1933, and *No Outspan*, 1943. His wife, a daughter of Dr Claude Wright, of Wynberg, Cape Prov., became the first woman member of the Union Parliament.

Reja (Sp.), a richly decorated iron screen in a Sp. church.

Rejuvenation, see under GLAND.

Relapsing Fever, acute infectious disease occurring among famine-stricken people; other names applied to the same condition are famine fever, 7-day fever, and bilious

R. F. It is caused by a specific micro-organism, *Spirochaeta obermeieri*, which is found in large numbers in the spleen. The period of incubation is from 5 to 7 days; the fever starts with severe pains in the back and limbs, rigors, and a high temp. (105-107°). Delirium, jaundice, enlargement of the spleen, profuse sweating, and intense thirst are characteristic of the acute stage. These symptoms continue for about a week, when they cease by crisis. There is an intermission for about a week, during which time no spirochaetes are found in the blood. Another paroxysm then commonly occurs, which may not be of such severity as the first. A third and fourth attack with similar intermissions may occur. Recovery is the general ending, the mortality being under 5 per cent. The disease, which is spread by lice, prevails among over-crowded and badly nourished communities, and occasionally occurs in the thickly populated dists. of E. Europe and of India and China. An epidemic occurred in Ireland in connection with the famine of 1826. In 1847-8 and 1868-73 there were outbreaks in London. Bodily cleanliness is important in the treatment and prevention. Penicillin is effective in treatment.

Relations, Maintenance of, see POOR LAWS; PARENT AND CHILD; HUSBAND AND WIFE.

Relativity. The theory of R. is the theory of the statement of the general laws of physics in a manner that is common to all observers under any conditions. A distinction should be drawn between the special theory and the general theory of R. Thus the assumption of Special R. is that the velocity of light and indeed all the laws of nature are the same in all co-ordinate systems moving uniformly, relative to each other. In General R. this is extended to co-ordinate systems in non-uniform (i.e. accelerated) relative motion. The consequences that flow from these assumptions present sev. difficulties to someone trained in the ways of pre-relativity physics. First he must be prepared for a fundamental change in his imagination; at the same time the necessary substitution of Riemannian geometry for Euclidean geometry and of Einstein's dynamics for Newton's dynamics demands a specialised knowledge of higher mathematics. It is possible, however, to indicate in a non-mathematical article some of the difficulties that occurred in pre-relativity physics and to show the general line of advance of the theory of R.

The 19th-cent. physicist postulated the existence of an absolute and all-pervading ether (q.v.) as the medium through which light travels. The earth, like other bodies, was supposed to pass freely through this ether. In other words, the motion of the earth relative to the ether created the effect of an 'ether wind.' Hence a terrestrial observer should find that light travels faster with this 'wind' than against it, and faster across the ether wind than against it. The details of the

fault occurs in the winding, the current values at the ends become unequal and the difference in the transformer secondaries operates the R., which then trips the circuit-breakers, isolating the machine and suppressing the field. Electronic R.s, thyatrona (q.v.), are used for speed control of motors, as automatic switches in timing circuits and for operation of R.s with photocells.

Release, in law, valid discharge by one person of a legal right or claim against another. To be effectual a R. should be by deed (q.v.), especially where the person released gives no consideration (q.v.). The right of payment of a cheque may, however, be given up by mere surrender of the cheque itself to the drawer. Liability under a contract under seal (see CONTRACT) can be discharged only by a R. under seal. A R. given by an infant is invalid.

Relics (O.F. *relique*, Lat. *reliquiae*, from *relinquere*, to leave behind), remains of the bodies of holy persons, or other objects connected with them, which are revered for their sake. The practice is both older and more widespread than Christianity, and is found, for example, among Buddhists. The miracles that are well attested in connection with certain relics are taken as divine approval of this veneration, as well as a sign of the power of the saint's prayers with God. Scriptural authority for these beliefs is drawn from such passages as 2 Kings xlii. 21; Acts xix. 12. In the early Church great reverence was shown for the bodies of the martyrs, and the Eucharist was celebrated over their tombs. The early Fathers all take the practice for granted, though varying in their explanation of the cultus. Medieval scholastics define it as a 'relative cult of *dulia*,' i.e. the kind of reverence due to a human being, and 'relative' in the sense that this honour is paid only on account of the relationship of the object to the person. The enormous popularity of relics and the entirely uncritical attitude of the Middle Ages led to abuses, against which the reformers reacted to the extent of sweeping away the whole cultus. The Rom. Catholic Church preserves both doctrine and practice; the public veneration of R. is strictly controlled by Canon Law.

Relief, feudal incident originating when fiefs were not hereditary, being sums paid to the lord by the heir before he could enter upon possession of his lands. William I fixed the sum at 100s. or, in lieu, so many arms, for each knight's fee; William II exacted arbitrary R.s but, in his Charter of Liberties, Henry I enacted that R.s should be 'just and lawful.' In the time of Henry II the regular R.s were 100s. for a knight's fee and £100 for a barony; these R.s were only payable if the heir was of age; if a minor he became a ward and paid no R. Articles 2 and 3 of Magna Carta confirmed the sanct R.

Relief Lane, see LACE.

Relief Maps, see MAPS.

Reliefs, see BAS-RELIEFS.

Religion, from Lat. *relegere*, to treat carefully (Cicero, *De Nat. Deorum* ii, 28) *religare*, to bind together (Lactantius, *Instil. Div.* iv. 28), or *religere*, to recover (Augustine, *De Civitate Dei*, x. 3), may broadly be defined as the acceptance of obligations towards powers higher than man himself. R., further analysed, also implies: (1) The belief that these higher powers are of a personal nature, not merely blind forces. In the higher R.s there is the recognition of one Divine Being, either infinitely transcendent, but not uninterested in the conduct of man (Theism), or totally immanent in, and identified with, the Reality behind the phenomenal universe (Pantheism). In lower R.s numerous gods are admitted, though the tendency to recognise one as supreme is apparent as the scale of intelligence is improved. (2) The ascription to the Being or Beings of certain moral qualities, in virtue of which they are pleased or displeased with the behaviour of man. The standards of morality attributed to them vary enormously, but the idea that they are judges of right and wrong can usually be detected. (3) The idea that the deity is to be obeyed, or at least placated, or retribution will follow. There is a need of assistance from the Divine Being which may be obtained on certain terms. Thus good relations with the Divine are bound up with man's happiness. In the lowest R.s the favours sought and the evils avoided are material, good crops, victory in war, natural fecundity, etc.; in the higher R.s the needs of the soul occupy the most important place; and in the highest the end sought is complete union with the Divine Being. Christianity does not recognise this union as destroying personality; Buddhism presumes complete absorption with loss of separate identity. (4) In most R.s the idea of reward and punishment after death. From this it will be seen that R. covers beliefs, i.e. 'faith,' and actions, i.e. 'morals.' Acts of 'worship' embody the beliefs in ritual actions. Round each of these general ideas are a large number of practices, such as penances, prayer, healing, festivities, ritual observances, e.g. sacrifices, and teaching on morals and the life hereafter, inscribed, when the standard of civilisation permits it, in sacred books.

In antiquity and in the Middle Ages the universality of R. was taken for granted, though its forms were known to differ widely. With the discovery of new continents, travellers and missionaries reported the existence of tribes with apparently no R.; but further investigation invariably showed that such was not the case. To-day vast areas, e.g. the U.S.S.R., are militantly atheistic, but the attempts to eradicate R. have proved a signal failure. In fact, R. is found to be a normal constituent of human life; modern theorists, who place the origins of R. in fear of the unknown in nature and the attribution to it of superhuman powers, ignore the permanent

craving in man for communion with God.

Apart from this 'modern' theory (which was familiar to the ancients—e.g. Lucretius), the origin of R. has been variously explained. (1) The Bible tells of an original divine revelation of Monotheism (q.v.). (2) Philosophers like Plato, by the use of reason, can arrive at monotheistic belief; but few have done so, and it cannot be responsible for the notions of primitive tribes. (3) Some hold that man's primitive conception of a personal force behind the powers of nature is an application, however crude, of the principle of causality. The primitive man asks: Who sent the rain? The philosopher asks: Who organised the universe of which the rain is a minor phenomenon? (4) It has been urged that man has an intuition of God, and of his dependence upon Him. This, however, leaves unexplained the fact that large numbers of individuals have little or no religious bent. (5) The animist theory (Lat. *anima*, soul), propounded by E. B. Tylor, supposes that from dreams, etc., primitive people derived a notion of the soul; then by a confusion of ideas they transferred this soul-idea to things both living and inanimate. Thus there grew up the idea that the tremendous phenomena of nature were to be attributed to powerful spirits inhabiting the elements (see ANIMISM). Herbert Spencer derives R. from 'Shintoism,' or ancestor worship. This, however, is not properly R., though sometimes connected with it (see ANCESTOR WORSHIP). (6) Another theory maintains that the oldest form of R. is the veneration of the totem (see TOTEMISM) or sacred animal or plant of the tribe. The tribe is supposed to have derived its origin from this totem, and a spirit of the totem dwells in the different individuals of the species, which are therefore regarded as sacred, and deserving of veneration. By the process of war and conquest one clan would emerge as triumphant, and so its totem would be regarded as superior to all others. Thus by degrees grew up the idea of a supreme being. The totem theory, however, in addition to other defects, takes for granted the idea of superior spiritual forces, which it does not explain. (7) Fetish worship (see FETTERISM) in essence supposes that it is possible to imprison a spirit or power inside a small object, carried about for protection. The fact that this fetish worship is part of the R. in primitive tribes, however, in no way proves that it originated all R. As with totemism, fetishism supposes but does not explain a belief in the existence of higher powers. Only if we suppose that a lower religious concept must precede a higher one is there any reason for placing this idea at the origin of R. The tendency to suppose that lower religious ideas necessarily precede higher ones was taken for granted among scholars of the last century, intoxicated with evolutionary theory, but has been largely disproved by W. Schmidt

in his *Ursprung der Gottesidee (Origin and Growth of Religion, 1931)*.

In the 19th cent. there began the independent research into all known forms of R. on an entirely factual basis, the study of the hist. of R. with that of various concepts, e.g. of God in each religion, and of the corresponding external rites, ceremonies, sacred books, priesthood, etc. Upon this basis arose the study of comparative R., the different elements of which compares each R. and attempts to reach the common thought behind them. The meanings of primitive rites, and such ideas as sacrifice, were traced through various R.s. The occasional dependence of one R. upon another was illustrated by this method.

In itself the study of comparative R. neither proves nor disproves the truth of any R., nor does it seek to do so; it does, however, show that while some are higher or more intelligent than others, yet there is a certain universality of idea. There has, however, been a tendency to assume that every likeness originated in essentially the same idea, whereas such analogies may be superficial.

Another study, the psychology of R., proceeding also on a factual basis, examines the various states of man under religious influence. Without questioning what influence the Divine may exercise, it examines entirely on the human side such phenomena as ecstasy, frenzy, diabolic possession, sudden conversion, faith healing. It inquires how far these things are explicable by purely natural causes, and how far not. Many books have been written also on what is called the philosophy of R.; to a large extent this coincides with natural theology (q.v.).

The principal R.s in the world to-day are as follows: (1) Paganism, which includes animist forms of R.: central regions of S. America; the native tribes of Canada, Siberia, and Australia; central Africa. Animism is found among Negroes, Red Indians, Maoris, Javanese, and the old Mexicans. (2) Judaism (q.v.) the R. of the Jews (q.v.), which is the basis of Christianity (q.v.) and Mohammedanism (see ISLAM), and a strict ethical monotheism. (3) Hinduism (q.v.), the ant. Pantheistic R. of India, where it still holds the vast majority of the people. (4) Buddhism, an offshoot of Pantheistic Hinduism, founded at Benares about 500 bc upon the teaching of the ascetic philosopher Buddha (q.v.). It split into (a) *Mahayana*, with elaborate ritual, and a developed Pantheon, which is followed in Nepal, Tibet, Mongolia, China, Japan, and Korea, and (b) *Hinayana*, more primitive and severe, found in Ceylon, Burma, Thailand, and Vietnam. (5) Shintoism, the native R. of Japan, is a mixture of nature worship and the veneration of ancestors and of the Emperor as descended from the Sun God. As a number of deities are worshipped it may be classed as polytheistic. (6) Confucianism, derived from the philosopher Confucius (q.v.), who lived in the

Shantung prov. of China 537-478 BC. He accepted the prevailing R. of his country, and reinforced it with his own moral and social teaching. It is a mixture of monotheism with the worship of inferior nature-spirits. In popular Confucianism ancestor worship plays a large part. It became the State R. of China, though many Chinese were followers of Taoism (see LAO TSEZ), a gross form of idol worship. (7) Christianity (q.v.), which is strictly monotheistic. (8) Mohammedanism or Islam (q.v.) is a strictly monotheistic R., founded by Mohammed, inspired by Judaism and Christianity. The *hejira* or 'flight' (of Mohammed from Mecca to Medina) took place in 622, the official starting-point of the Moslem era. There are about 100 Moslem sects, including the Shi'ites (mainly in Persia), Kharjites, Qarinitians, Ismaelites, Assassins, and the Sunnites.

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Religious Tract Society, see UNITED SOCIETY FOR CHRISTIAN LITERATURE.

Remagen, Ger. tn in the Land of Rhineland-Palatinate (q.v.), on the l. b. of the Rhine (q.v.), 60 m. NW. of Mainz. It has Rom. remains, and it has a remarkable Romanesque gateway. During the Second World War Amer. forces seized an undemolished bridge at R. on 7 March, 1945 and estab. the first Allied bridgehead E. of the Rhine. Pop. 6,000. See WESTERN FRONT IN SECOND WORLD WAR.

Remainder, see CONTINGENT REMAINDER.

Remand, Remand Homes, and Remand Centres. A court of summary jurisdiction is empowered to remand an accused person either in custody or on bail, with or without sureties. The remand may be for the purpose of obtaining further evidence necessary for the trial, or it may be ordered after conviction but before sentence to procure information that would shed light on the most suitable method of dealing with the offender. No single period of remand may exceed 3 weeks. Under the Criminal Justice Act, 1948, it can be made a condition of remand on bail that the accused should undergo a medical examination at a specified institution, or by a specified medical practitioner. Unless there are valid reasons to the contrary, a court is expected to remand an accused person on bail. An adult person remanded in custody is sent to a prison. Prisoners on remand and those awaiting trial by the higher courts are kept separately from other prisoners. Though they have certain privileges as to food, etc., they are subject to the general discipline of the prison, but are not required to work unless they wish to.

Since juvenile offenders cannot normally be sent to a prison, special remand homes have been set up for them. The homes also provide accommodation for those who are awaiting vacancies in approved schools, whether they are delinquents or care and protection cases. Moreover, a child or young person found guilty of an offence punishable in an adult with imprisonment may be sent to a remand home as a penalty for a period not exceeding 1 month. The numbers so sent are small. The remand homes are controlled by the local education authorities, but under the Criminal Justice Act, 1948, no premises may be used for this purpose unless previously approved by the secretary of state, who must also approve the appointment of the persons in charge.

Since one of the aims of the Criminal Justice Act was to keep young adults out of prison, it gave the secretary of state powers to set up state remand centres for offenders aged 17-21. These must have facilities for the observation of offenders on whose physical or mental condition a medical report is required by the courts. They will also be empowered to take young persons, aged 14-17, on whom such reports are required if no other facilities are available, and those of this age who are 'too depraved or unruly' for a remand home. Until the remand centres come into being this latter group can still be sent to prison. No remand centres have as yet been set up, and there seems no immediate prospect of the provision of funds for this purpose. Even when they are estab. there will still be no state provision for the observation of children under 14. Under the Criminal Justice Bill, 1938 (dropped on the outbreak of war), it was proposed to set up state remand homes for this purpose. There was no corresponding clause in the 1948 Act, though local remand

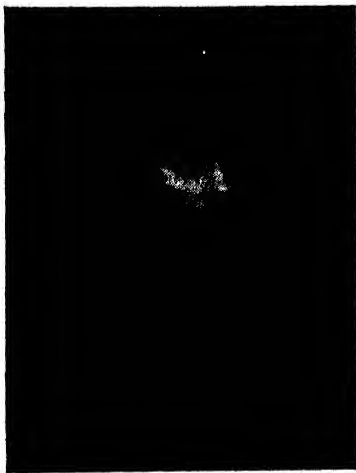
homes are not usually large enough to provide the technical facilities needed.

Remarque, Erich Maria (1898-), Ger. novelist, b. Osnabrück, his real name being Kramer. He fought in the Army in the First World War. He made his name with the war novel *Im Westen Nichts Neues*, trans. into Eng. by A. W. Wheen, under the title *All Quiet on the Western Front*, 1929. In Germany, over which country it swept like a gospel, 500,000 copies were sold in less than 3 months from pub. It went further than the frankness of Zola, being brutal and devoid of romanticism, but alive with a terrible realism and pathos. His later novels, though not so outstanding, continued the theme of a world in which the individual was crushed by the irrationalism and blind cruelty of the world. These are *Der Weg Zurück*, 1931, *Drei Kameraden*, 1937, *Flotsam*, 1941, *Arc de Triomphe*, 1946, and *Der Funke Lebens*, 1952. After living in Switzerland for 11 years he went to the U.S.A. and became an American citizen.

Rembrandt Harmensz van Rijn (1606-69), Dutch painter, b. Leyden. His family recognised his artistic talent, and

painting her many times. To this period belong his most light-hearted and gay pictures. He was extremely successful and had a host of pupils, but the fortune he amassed was soon dissipated by his extravagances. Saskia died in 1642, and R. married his housekeeper, Hendrickje Stoffels, a peasant. His last years were marred by financial troubles: his prestige as an artist fell, and his eyesight began to fail. He died neglected, in poverty.

R. stands pre-eminent among the Dutch masters, and his work equals the skill and beauty of Velázquez or Titian, while in his expression of spirituality he has no rivals. He was a most prolific painter, and some 600 of his paintings, 2000 drawings, and 300 etchings are extant. He led the reaction against mannered Italian influences, and substituted naturalism in place of artificial classicism. In oils he painted portraits, landscapes, and religious subjects. His work can be grouped into 3 periods. At the time of his first marriage it already shows signs of his preoccupation with the effects given by using a full light upon the central point of interest, but he exercises the care in detail of a beginner, and frequently shows himself indebted to the teaching of his masters. In the second period R.'s entire treatment of a painting is bolder and more individual. The soft gold and brown shades, so characteristic of his greatest work, appear increasingly often, and his contrasts of light have become more forceful and dramatic. The final period represents his work at its most mature, and, to this time, belong the majority of his masterpieces. He had learned to employ with great effect the power of chiaroscuro which he had discovered perhaps through Honthorst and ultimately from Caravaggio. A rich, deep red frequently appears among the browns and golds. The same 3 stages of development can be traced in R.'s etchings. In his earliest work of this kind his paramount concern was accuracy of detail. Later he freed himself from this preoccupation, and, in his hands the etching ceased to be predominantly a design, and became, like his portraits, a medium through which R. could express depths of spiritual feeling which even Dürer, the other master of the art of etching, never attained. In his masterpiece, 'Christ healing the Sick,' as in other etchings of his most mature period, R. used dry-point to emphasise light and shadow effects; and he attained a broad majesty of conception, while not neglecting detail essential to his design and theme. His portraits are intensely lovely, because of the depth and beauty of their characterisation. The character of R.'s painting is so unusual and so strong that his name has come to stand for certain marked features in art. He delighted in using strong contrasts in dark and light, and was an unsurpassed master in the use of shadows and half-tones. The strongest point of light in a picture expressed the crux of the subject. His portraits



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REMBRANDT

Self-portrait, when young (detail).

he was sent to study painting under Jan van Swanenburgh. He then went to Lastman's studio in Amsterdam, and returned to Leyden to begin his career as a painter. His brilliant drawing and skilful use of oils estab. his reputation, and in 1631 he settled in Amsterdam. He married Saskia van Uylenborch in 1634,

express intense humanity, and his studies of old people, peasants, and beggars are remarkably fine. R. excelled in minute detail, yet his works which contain large groups of people are wonderfully well composed. This skill of composition is admirably shown in 'The Syndics,' where, in spite of each study being strong as an individual portrait and apparently of equal importance. R. has made the picture a united whole, rendering as a complete study portraits of 6 distinguished gentlemen. His self-portraits are a wonderful and moving series. Among many famous works are 'The Philosopher' (National Gallery), the so-called 'Night Watch' (Rijksmuseum), the 'Anatomy Lesson' (Hague), 'Bathsheba after the Bath' (Louvre), 'The Entombment' (Munich). The Brit. Museum contains a fine collection of his etchings, and the National Gallery of his paintings. See lives by G. B. Brown, 1907; J. Laran, 1928; O. Benesch, 1935; A. M. Hind, 1938; H. Dumont, 1948; and J. Rosenberg, 1949.

Remembrancer, Queen's, officer of the Exchequer dept whose duties were to record certain documents and proceedings and issue processes. The officials so styled were formerly called clerks of the remembrance, and they were 3 in number, the Q. (or King's) R., the lord treasurer's R., and the R. of first fruits. The duties of the first and second of these offices were united by an Act of 1833. The Q. R. was attached to the Supreme Court in 1873, and in 1879 the Senior Master of the Supreme Court was given the title. The 'Queen's and Lord Treasurer's Remembrancer' is the head of the Exchequer Office in Scotland, a sub-dept. of the Treasury.

Remi, or Remy, St., see REMIGIUS, ST.

Remigius, Saint (c. 440-533), apostle of the Franks, b. Cerny or Laon; son of Emile, count of Laon. He probably studied at Rheims, where, although a young man, on account of his learning and sanctity, he was elected archbishop in 469. He converted Clovis, King of the Franks, with the assistance of St Vedast and Clovis's wife St Clotilde. He erected bishoprics at Tournai, Cambrai, Terouanne, Arras, and Laon. He died at Rheims. His feast-day is 1 Oct.

Remington, Philo (1818-89), Amer. inventor, b. Litchfield, New York. He superintended the manufacturing dept of his father's small-arms factory, and invented the breech-loading rifle and typewriter (1873) which bear his name.

Remiremont, Fr. tn in the dept of Vosges, on the Moselle. From the 11th cent. until the Revolution there was a famous nunnery here, of which the abbess was a princess of the Holy Rom. Empire; the buildings, including the church, remain. There are textile and mechanical manufs. Pop. 10,300.

Remittent Fever. See MALARIA.

Remisia (Remijia), genus of tropical trees of the order Rubiaceae, from which comes the cuprea bark used in manufacturing quinine, especially from the

species *R. vellost*. The bitter principle of the bark is 'vicine,' or vicric acid.

Remonstrance, Grand, statement introduced into Parliament by Pym (q.v.) in 1641, which narrated in a series of clauses the alleged various unconstitutional acts and illegalities of Charles I, both in church and state matters, since the beginning of his reign. The debate on the G. R. was followed by a div. in which it was carried by 11 votes, and ordered to be printed as an appeal to the nation. The debate confirmed the emergence of a strong Royalist party in the Commons.

Remonstrants, Dutch Calvinist sect, founded by Arminius (q.v.), so-called in 1610, after its members had sent a remonstrance to the states, denying any wish to cause a conflict in the church. Prince Maurice had them proscribed (1625), and they suffered bitter persecution until his death (1652). See under ARMINIUS, JACOBUS.

Remora, see SUCKING FISH.

Remote Control, see TELECONTROL.

Remscheld, Ger. tn in the Land of North Rhine-Westphalia (q.v.), 16 m. E. of Düsseldorf (q.v.). It was severely damaged by bombing in the Second World War. There are important iron and steel works, and manufs. of tools and textiles. Röntgen (q.v.) was b. in the suburb of Lennep. Pop. 115,600.

Remsen, Ira (1846-1927), Amer. chemist, b. New York city, and educ. in New York and Tübingen, Germany. He did research in pure chem. and became prof. of chem. at Johns Hopkins Univ. in 1876, and president from 1901 to 1913. In 1879 he founded the *American Chemical Journal*. In the same year he described in this jour. a new compound which he had discovered (with Fahlberg). This became known as saccharin (q.v.).

Remus, twin brother of Romulus (q.v.).

Rémusat, Charles François Marie Comte de (1797-1875), Fr. statesman and man of letters, b. Paris. He became a journalist and also studied law. From 1830 to 1848 he was a member of the Chamber of Deputies, and in 1840 minister of the interior. After the *coup d'état* he was exiled, but returned to Paris in 1871, and was minister of foreign affairs (1871-3). During his absences from public life he devoted himself to literary and philosophical studies. Amongst his works are *Essais de philosophie*, 1842, *Histoire de la philosophie en Angleterre depuis Bacon jusqu'à Locke*, 1875, and studies on various noted men, including Bacon, Herbert, Wesley, etc. His letters were pub. 1883-6.

Rémusat, Jean-Pierre-Abel (1788-1832), Fr. sinologist, b. Paris. He studied medicine, and took his diploma in 1813; but at the same time he devoted himself to oriental languages, particularly Chinese, and in 1811 pub. an essay on Chinese language and literature. In 1814 he was appointed to the chair of Chinese at the Collège de France; became a member of the Académie des Inscriptions in 1814; and 10 years later was made Keeper of Oriental MSS. at the Bibliothèque Royale.

Amongst his numerous works are the *Grammaire Chinoise*, *Recherches sur les langues Tartares*, *Mélanges asiatiques*, *Histoire du bouddhisme*, and *Recherches historiques sur la médecine des Chinois*. See B. de Sacy, *Notice sur la Vie et les Ouvrages de Remusat*, 1834.

Remy, or Remi, Saint, see REMIGIUS, SAINT.

Remy de Gourmont, see GOURMONT.

Renaissance, or Revival of Learning (Fr. *renaître*; Lat. *renascari*, to be born again), name given to the important movement which marks the birth of modern Europe. The word was first applied to the revival of Gk and Lat. forms in architecture and literature in Italy. But the R. was more than a pure return to ancient forms. Although it professed in some ways to despise the Middle Ages, it nevertheless emerged from the preceding centuries and owed much to them. Indeed, no definite line can be drawn between the R. and the period called medieval; R. tendencies existed alongside the medieval for centuries, and only gradually did society become wholly coloured and transformed by them; Dante was writing when the medieval world was apparently at its zenith. But the R. had qualities peculiarly its own. It represented an outburst of individualism, a new freedom of thought and action, a quickening of personality on every side of human life, from fashion in dress to speculation on this world and the next. It was intensely curious and intensely interested in humanity. With this interest in man came a new interest in the workings of nature and in science. There was a broadening and sharpening of a critical faculty which, though kept alive by the schoolmen, had not developed far in the atmosphere of ultimate reverence for authority which marked the Middle Ages. The R. began in Italy, which, though politically disunited and vulnerable to foreign invasion, possessed the standard of material well-being necessary for cultural development. Milan, Florence, and Venice especially had accumulated wealth by trade over a long period, and the growth of this middle-class urban interest had broken the back of feudalism in N. and central Italy much earlier than elsewhere in Europe, except for similar areas of mercantile prosperity in Flanders and in some Ger. free cities. Italy, however, possessed other advantages which these areas lacked. She had a direct connection with the Rom. world; her geographical position and trade had kept her in constant and close touch with Greece and the E.; she had early developed a national language and literature, and was the home of a rich and intellectually enlightened papacy. Historical opinion is now generally inclined to the view that Europe was on the verge of discovering the impulses of the R. at the time when the R., percolating Italy from Byzantium, discovered Europe; Italy's geographical position was decisive in making her the centre of the new ideas. A new energy seemed to vitalise society. The R. idea, unlike that of the medieval schools, was

not of the specialist but of the all-round man, illustrated by the career of Leonardo da Vinci (q.v.), who was not only a painter, but a philosopher, metaphysician, athlete, inventor, and naturalist.

The medieval world had never entirely lost touch with the literature of classical times, but its knowledge was confined to a few writers, and was very fragmentary. In the days of Petrarch (1304-74) Italians began to search more diligently for the lost treasures of Gk and Rom. writers, to copy the style of the Romans, and to learn Greek. Petrarch both sought classical learning himself and inspired others like Boccaccio to follow the same path. This movement grew in volume and vigour, strengthened by successive discoveries of the writings of Gk and Lat. authors. Long before the capture of Constantinople by the Turks (1453) teachers of Greek e.g. Chrysoloras (q.v.) found their way to Italy, though the fall of Byzantium naturally accelerated the trend. The collection and copying of MSS. became a considerable industry, and libraries were established to house the precious texts, such as the Laurentian Library at Florence. Critical scholarship increased with the coming of printing.

Humanism was not confined to Italy. Reuchlin (1455-1522) (q.v.) furthered the knowledge of Greek in Germany, though



RENAISSANCE ARCHITECTURE: ENGLAND
Fan-vaulting in the roof of the Henry VII Chapel, Westminster Abbey.

he was more interested in Hebrew and the Bible than in pagan learning. This preoccupation with the spiritual characterises the N. R. Through Reuchlin and von Hutten in Germany, Lefèvre d'Étaples in France, Linacre, Grocyn, Colet, and More in England, and, above all, through Erasmus of Rotterdam, the humanism of the R. in Italy was connected indirectly with the Reformation (q.v.) in religion. Many of these N. humanists never swerved from their adherence to the Catholic Church: More died rather than deny its supremacy; and it is now generally acknowledged that,

but for other existing conditions, the R. might have encouraged merely religious reform, and not the break-up of religious unity. As it was, however, the New Learning helped to dispose men's minds for the Reformation. In France the R. gave a new stimulus to literature, as may be seen in the lyric poetry of Ronsard and the *Pléiade*. In prose Rabelais's vast novels exhibit the freedom, licence, and immense vitality of the new humanism. In Montaigne can be found the intense interest in the individual, and the clarity of expression to be typical of the greatest age of Fr. prose. In England the beginnings of the R. can be seen in the works of Chaucer. In the early 16th cent. its beginnings appear in the centres of learning at Oxford and Cambridge, and its earlier exponents include earnest and strenuous scholars like Roger Ascham, Nicholas Udall, and Sir John Cheke. The full flowering of R. literary ideals is reached in the Elizabethan epoch. Sidney and Spenser have their continental counterparts, but in the plays of Shakespeare literary skill is combined with a deep interest and understanding of human nature, making Shakespearean drama among the highest expressions of the finest things for which the R. stood.

But the revival was not merely literary. From the first the spirit as well as the letter of classical times appealed to the men of the new age. So to the humanists of the R. neither the manner nor the matter of the scholastic education sufficed any longer. In this more secular age the classical writers were to be read and interpreted by and for themselves. That these writers were pagan did not prevent popes like Pius II or Leo X from fostering their study. In this art and literature the humanists found a new ideal of beauty and freedom. This led sometimes to corruption and licence, though it would be inaccurate to attribute the moral decadence of the period in Italy to the classical revival. Guicciardini and Machiavelli, the 2 greatest historians of the It. R., found their inspiration and model in the ancient political and historical writers, notably Livy. It was not, however, the arts, letters, or philosophy of the Greeks that attracted Machiavelli, but the Lat. histories describing the statecraft and organisation of the Romans. Guicciardini's *Ricordi Politici* equally with Machiavelli's *Principe* represents the spirit of the It. people in the last phase of the R. The great exponent of the spirit of classical literature in Italy in the same period was Ariosto. The new interest in the individual led to the development of biographical and autobiographical writing. The educationists, of whom da Feltres is outstanding, based their theories of education largely on classical models and on the study of Latin and Greek.

Modern architecture is directly descended from that of the It. R. Men had not lost touch with the ideas of Rome and Byzantium; but now interest became more specialised. The definition of the

various classical orders of architecture by Vitruvius, the Rom. architect and engineer of the Augustan age, was revived and applied, especially by Palladio (1518-80). But R. builders did not copy slavishly. They adapted and combined classical, and above all Rom. forms, with existing styles, so that an altogether new type of architecture finally evolved. In Italy Florence led the way. Brunelleschi's dome for the cathedral (1436) serves as an outstanding example of the new trend. St Peter's, Rome, which contains examples of the various stages of R. architecture, is another. The It. styles spread to France, partly through the Fr. invaders of the country, and there found its best expression in secular royal buildings, like Fontainebleau and the early Louvre. In Germany, Heidelberg Castle and many in halls (*Rathäuser*) of the free cities show the transition from Gothic to the new ideas. Antwerp in hall (1566) illustrates their penetration to the Low Countries. In England the transition to classicism was slower, and unique in character. The last glories of Eng. Perpendicular owe part of their charm to R. touches of decoration: a fine example of the combination of Perpendicular and baroque can be found in the ceiling treatment in one of the smaller chapels of Ely Cathedral. The gracefulness of the Eng. architectural R. owes much to the interest of Henry VI and Edward IV in the arts, while the disturbed state of the country during the wars of the Roses, by making building operations more protracted, ensured that the transition should be slow, an adaptation rather than, as in Italy, complete rebuilding (except in necessary cases, like St Paul's). Not till Inigo Jones returned from Italy in the 17th cent. did the change become rapid, to reach its zenith with Wren.

The genius of the R., its freedom, love of beauty, joy in nature and humanity, found its most complete expression in painting. The development was partly one of technique, marked by the increased knowledge of perspective, of light and shade, of the anatomy of the human body, the discovery and growing use of oil for painting. The growth of variety and luxury in dress at this period affected painting, as did the increased interest in secular life. Religious scenes were still painted, but artists dealt increasingly with the life around them. They concentrated more on portraits and painted scenes from pagan mythology. Da Vinci and Raphael achieved perfection of draughtsmanship and colour-work, but after them It. painting declined, though its technical skill was retained. Outside Italy the rise of a new spirit in art is best seen in Germany and Flanders. Dürer and Holbein are the 2 outstanding Ger. artists. In Flanders, where there was an accumulation of wealth comparable to that of the N. It. tns, there was a native growth of painting independent of Italy, and of great importance. In the early 15th cent. the Van Eycks brought a new science of colour into painting. Bouts

and Memling contributed an accuracy of perspective and a better knowledge of humanity. The Brueghels based their interpretation of Flem. secular life on these foundations.

The R. opened up new fields in every branch of science. Ptolemy's theory that the earth was the stationary centre of the universe was destroyed. Copernicus, Brahe, Kepler, and Galileo were the founders of the new school of inquiring astronomers whose ideas were too strong to be quelled by any opposition. Other sciences also developed. Astronomy de-

veloped: the telescope, microscope, and the spiral spring, which provided the first watches, were among other inventions.

The development of navigation, with the use of the astrolabe, quadrant, and sextant, their use bound up with the growth of astronomy, and the revival of the classical interest in cartography both affected and were affected by the explorations which marked another side of the R. In Spain and Portugal the main energies of the new age were directed to this channel; and in England and France exploration and colonisation, though they came later, were also important. The significance of the discoveries can hardly be exaggerated. The widening of the physical horizon brought a corresponding extension of the intellectual horizon, which profoundly affected the political, philosophical, and religious ideas of the next centuries. *See also* ARCHITECTURE; PAINTING; FRENCH ART; FRENCH LITERATURE; ITALIAN ART; ITALIAN LITERATURE; ERASMUS; LEONARDO DA VINCI; RAPHAEL, etc.

See J. Burckhardt, *The Renaissance in Italy*, 1875; J. A. Symonds, *The Renaissance in Italy*, 1875-88; J. A. Gotch, *Early Renaissance Architecture*, 1891; R. Blomfield, *Renaissance Architecture*, 1897; L. F. Field, *Introduction to the Study of the Renaissance*, 1898, and *The Medici and the Italian Renaissance*, 1901; C. H. Hoskins, *The Greek Element in the Renaissance of the Twelfth Century*, 1920; L. Batiffol, *The Century of the Renaissance*, 1921; S. Dark, *The Story of the Renaissance*, 1923; H. Höfding, *History of Modern Philosophy*, 1924; C. Davenport, *Architecture in England*, 1924; E. Sichel, *The Renaissance*, 1928; W. H. Hudson, *The Story of the Renaissance*, 1930; A. von Martin, *Sociology of the Renaissance*, 1945; J. Atkins, *The Renaissance*, 1947; and F. J. Mather, *Western European Painting of the Renaissance*, 1948.

Renal, *see* RONSE.

Renal Calculus, *see* under CALCULUS, in medicine.

Renan, Joseph Ernest (1823-92), Fr. philosopher, philologist, and historian, b. Tréguier, Brittany; he studied first for the Rom. Catholic priesthood, but quickly abandoned this vocation. In 1840 he studied philosophy at Issy, and later at St Sulpice, and in 1845 proceeded to the Oratorian lay college of Stavistas. He became deeply interested in the study of oriental languages, and in 1847 won the Volney prize (Institut de France) with an essay on Semitic languages; he wrote also *L'Avenir de la Science*, pub. 1890. This is noteworthy as foreshadowing later developments; in it he anticipated a state in which philosophy and culture should supersede politics and religion. During 1849 he travelled in Italy, gathering material for his thesis on *Averroës*, pub. 1852. He became a member of the Académie des Inscriptions in 1856. His *Etudes d'histoire religieuse*, 1857, and *Essais de morale et de critique*, 1859, including the celebrated essays on *Celtic Poetry*, on *Critical Histories of Jesus*, and



Anderson

RENAISSANCE PAINTING: ITALY
'Beatrice d'Este' by Leonardo da Vinci.

ended on the parallel developments in mathematics and physics. Modern chem. was slower, but already the Swiss, von Hohenheim (1493-1641), had declared that the true work of chem. was not to make gold but to prepare medicines. Medical knowledge was progressing. The new interest in man led to the closer study of anatomy. It has been seen how this influenced painting. It also led to further developments in the field of medicine itself, such as the discovery of the circulation of the blood by Wm Harvey in the early 17th cent. Printing, which was to make knowledge so much cheaper and widely accessible, has already been men-

on *Feuerbach*, and his new trans. of the Book of Job and the Song of Songs, 1859, appeared prior to his Syrian tour, 1860. On his return from Syria he succeeded Quatremère as prof. of Hebrew at the Collège de France; but his rationalistic attitude caused his suspension until 1870, after the siege. Meanwhile he began his great 'History of the Origins of Christianity': *Vie de Jésus*, 1863, *Les Apôtres*, 1866, *St Paul*, 1867, *Antéchrist*, 1873, *Les Évangiles*, 1877, *L'Eglise chrétienne*, 1878, *Marc Aurèle*, 1880. *The Life of Jesus*, in which R., writing purely as critic, philologist, and historian, accepted Jesus simply as an inspired but human philosophic teacher, caused an immense uproar in orthodox circles; and no fewer than 1600 books and pamphlets appeared in controversy during the ensuing year. The rest of his life was occupied chiefly with his philosophic dialogues and dramas, 1878-86, his *Souvenirs*, 1883, and the 5-vol. *Histoire du peuple d'Israël*, 1887, et seq. In 1878 he became a member of the Fr. Academy, and 2 years later gave a course of Hibbert lectures in England on *The Influence of Rome on Christianity*. R. was a master of language; his prose is the finest produced in France during that epoch. His philosophy contains half-truths and superficialities caused by his habit of sliding over, rather than facing, difficulties. Yet his research caused a controversy which survived his death and affected the position of institutional Christianity to an extent hard to estimate. R. always denied that he was an atheist. See studies by H. Taine, 1894; G. Sorel, 1906; M. Weller, 1945; Van Tieghem, 1948.

Renaissance, see RENAISSANCE.

Rendering, see PLASTER.

Rendsburg, Ger. tn in the Land of Schleswig-Holstein (q.v.), on the Kiel canal, 20 m. W. of Kiel (q.v.). It was a busy trading tn in medieval times, and was the seat of the provisional gov. of the insurgent Holsteiners. R. is an important centre of communications, and has shipyards and iron and steel industries. Pop. 45,000.

René the Good (1409-80), Duke of Anjou and Lorraine and count of Provence and Piedmont, second son of Louis II, King of Sicily and Naples, b. Angers. He succeeded to the dukedom of Anjou on the death of his brother, Louis III, and to the kingdom of Naples through the death of his brother, and of Joanna, Queen of Naples, the last heir of the earlier dynasty. Although he retained the title, he failed to establish an effective claim. In 1444 he negotiated with the English at Tours, and he married his daughter Margaret to Henry VI the following year. R. encouraged art and literature, and founded numerous charities, which earned for him his title. He himself wrote some verses and poems, his works being pub. at Paris and Angers in 1845-6. See J. Staley, *King René d'Anjou and his Seven Queens*, 1913, and E. Trenkler, *Das 'Livre du cuer d'amours esprits' des Héros René von Anjou*, 1946.

Renegade (Sp. *renegado*, a turn-coat), term first used of Christians who became Muslims to escape persecution. It now denotes one deserting a faith, cause, or country for an opposing one, for reasons other than conscience.

Renfrew: 1. Royal (since 1396) and municipal burgh of Renfrewshire, Scotland, on the Clyde, 6 m. WNW. of Glasgow. Once a great Clyde port, to-day it has shipbuilding and various engineering industries, and manufs. iron goods, furniture, and chemicals. R. has an airport within the burgh boundaries. Pop. 17,100.

2. Tn of Renfrew co., Ontario, Canada, on the R. Bonnetière, 58 m. W. of Ottawa; it has manufs. of textiles and machinery. Pop. 8,100.

Renfrewshire, SW. co. of Scotland, bounded N. and W. by the Firth of Clyde, E. by Lanarkshire, and S. by Ayrshire. The co. once formed part of the ancient kingdom of Strathclyde; antiquities of interest include sculptural stones at Inchinnan. William Wallace is said to have been born at Elderslie near Paisley. R. was the heritage of the Stuarts, and it has given its name to one of the titles borne by the heir-apparent since the time when Robert III made his son baron of Renfrew. The surface is diversified, hilly in the W., the highest point being the Hill of Stuke (1711 ft), and level in the E. The co. is watered by the Clyde, Gryfe, and White and Black Cart rvs. The grassy uplands furnish pasture for large numbers of sheep and cattle, and dairy farming is extensively carried on. Agriculture is important. Minerals include coal, copper, ironstone, and barytes. Greenock, Port Glasgow, and Paisley (the co. tn) are the prin. tns, the first 2 being important seaports; smaller tns are Renfrew, Johnstone, and Barrhead. Gourock is a popular holiday resort. There is a large industrial estate at Hillington. There are manufs. of thread and cotton (chiefly at Paisley), bleaching works, pottery, chemical works, and sugar refineries. Engineering and shipbuilding are also engaged in. The co. returns 2 members to Parliament, and the burghs of Greenock and Paisley 1 each. Area 240 sq. m.; pop. 321,200.

Reni, Guido (1575-1642), see GUIDO.

Renmark, port of S. Australia, on the R. Murray, 75 m. W. of Morgan. It was one of the earliest irrigation colonies, being estab. as such in 1887. Fruit-growing is estab. on a co-operative basis. Many of the settlers are ex-soldiers, settled on land specially developed for them after the two world wars. Pop. 4300.

Renn, Ludwig (1889-), Ger. author, b. Dresden, his real name being Arnold Vieth von Golsenau. His first novel, *Krieg*, 1928, a harsh and realistic treatment of the First World War, caused a sensation on pub., and in Germany almost equalled the popularity of Remarque's *Im Westen Nichts Neues*. Later R. became a Communist. His other novels include *Nachkrieg*, 1930, *Russland Fahrten* 1932; he pub. his autobiography, *Adel im Untergang*, in 1944.

Rennell, James (1742-1830), geographer, *b.* Chudleigh, Devon. His studies of oceanography and topography greatly influenced the development of Eng. geographical research. His publs. include *Bengal Atlas*, 1779, *Memoir of a Map of Hindostan* 1783, and *An Investigation of the Currents of the Atlantic Ocean*, 1832.

Rennell of Rodd, James Rennell Rodd, first Baron (1858-1941), diplomat and classical scholar, educ. at Haileybury and at Balliol College, Oxford. In 1883 he entered the diplomatic service. He was in charge of the Brit. agency at Zanzibar in 1893, and in Abyssinia in 1897 led a Brit. mission to Menelik. He remained in Africa until 1901, returning to Rome as secretary of legation (1901), and from 1904 to 1908 was Brit. minister at Stockholm. In 1908 he was appointed ambas. to Italy, where with the Fr. ambas., Camille Barrère, he was largely instrumental in divorcing Italy from the Triple Alliance. After the First World War he went to Egypt with Milner's mission; served as Brit. delegate to the League of Nations, 1921-3; entered the Commons as Conservative member for Marylebone, 1928; and was raised to the peerage in 1933. His 3-vol. *Social and Diplomatic Memories* covers his career between 1884 and 1919. His other works include sev. vols. of poems.

Renner, Karl (1870-1950), Austrian lawyer, Socialist, and statesman, *b.* Unter-Tannowitz, Moravia, the son of a farmer, and educ. at Vienna Univ. He entered the Austrian Parliament in 1907, and became leader of the Social-Democrats. On the dissolution of the empire he led the Austrian delegation to St Germain-en-Laye, 1919, where the frontiers of the Austrian rep. were settled. From 1919 to 1920 he was chancellor. R. was imprisoned for a short time after Dollfus's murder, and after his release lived in retirement at Gloggnitz. After the Second World War he headed the provisional gov. set up by the Allies, his appointment having special Russian approval. But R.'s policy soon emerged as independent and totally devoid of any leanings towards Communism, and at the end of 1945 he was elected president of the Austrian rep. R.'s consistent support of Socialist principles never prevented him from making every effort to co-operate with the Catholic political groups in Austria, and his example of combined idealism and conciliation undoubtedly played a large part in the estab. of a post-1945 Austrian rep. on W. European lines.

Rennes, tn of France, cap. of dept Ille-et-Vilaine, 51 m. SE. of St. Malo. It has a univ. (founded in 1735) and an agric. school, and is the seat of an archbishop. It is an important railway centre and essentially a modern tn—in spite of having been the anct. cap. of Brittany—as the old tn was destroyed by fire in 1720 and had to be practically rebuilt. The Palais de Justice, built in the early 17th cent., was the seat of the parlement of Brittany. The cathedral was begun in

1787, on an anct. foundation. The chief manufs. are textiles, leather, agric. implements, and crockery, and there are foundries and printing works. In 1356 it was besieged by the English, and in 1899 Dreyfus was tried here for the second time. R. was occupied by the Germans in June 1940, and liberated by Amer. forces in Aug. 1944. There was little war damage. Pop. 113,800.

Rennet, preparation obtained from the fourth or R. stomach of the calf, having the power of coagulating or clotting milk so that the fat is entangled in the curd. A standard of strength is that 1 part of R. should coagulate 10,000 parts of sweet milk in 40 minutes at a temp. of 95° F. It is prepared and obtainable in solution and as tablets and powder. See also **RENNIN**.

Rennie, John (1761-1821), civil engineer, *b.* Phantassie, E. Lothian, Scotland, and educ. at Edinburgh Univ. In 1784 he entered the service of Boulton & Watt, being commissioned by them to construct machinery for the Albion Flour Mills, Blackfriars Bridge, London. In 1790 he began constructing canals, and amongst his numerous works in England are the Avon and Kennet, Rochdale, and Lancaster canals; Waterloo (since demolished and replaced by a new bridge), Southwark, and London bridges; the London and E. India Docks on the Thames; Sheerness and Chatham dockyards; and Holyhead and Kingstown harbours. In 1798 he was elected F.R.S., and was one of the leading civil engineers of his age.

Rennin, or Chymosin, digestive enzyme or ferment found in the gastric juice of man and other mammals. It is responsible for the clotting of milk in the stomach by the conversion of soluble caseinogen into insoluble casein. Whereas liquid milk would pass quickly into the intestine, the clot is retained in the stomach, where the casein, a protein, is digested by the ferment pepsin, also present in gastric juice. A commercial extract of R. known as rennet (q.v.) is used for preparing junket from milk by the same process as occurs naturally in the stomach.

Reno, city of Nevada, U.S.A., and co. seat of Washoe co. on the Truckee R. It is a rail, air, commercial, and tourist centre, and the largest city in the state. The state univ. is at R. Meat packing, dairying, and flour milling are important industries. It manufs. bricks, tiles, sheet metal and lumber products, and beverages, and ships potatoes, wool, livestock, and ores from nearby mines. But it has achieved worldwide notoriety as the so-called cap. of divorce. Nevada laws require only 6 weeks' residence in order to qualify to sue for divorce in its courts, and the laws provide a very large number of grounds upon which divorces can be claimed. R. is also famous as a gambling resort. Pop. 32,497.

Renoir, Pierre Auguste (1841-1919), Fr. artist, *b.* Limoges. He was apprenticed to a Paris porcelain-maker, and later

painted fans and blinds. In 1861 he studied painting under Gleyre, and in his atelier he met Sisley, Monet, and Bazille. He painted landscape with his friends at Fontainebleau, and first exhibited at the Salon in 1864. Ten years later he took part in an exhibition with other Impressionists. His early work shows the influence of Courbet, but Monet guided him to open-air effects, which he painted with much gaiety. The study of Ingres and a visit to Italy (1881) alienated him from Impressionism. In later life, settled at Cagnes, he entered a new period, in which (though crippled by arthritis) he painted roseate and joyous nude studies. 'Les Parapluies' (National Gallery) is a beautiful harmony of greys, blues, and lavender. 'La Baigneuse' was a constant theme. R. was a prolific and spontaneous painter; he did over 150 lithographs and 6000 paintings. Contemporary Paris life produced such masterpieces as 'Le Déjeuner des Canotiers' (Washington). See lives by G. Besson, 1930; M. Florisoone, 1938; and G. Bazin, 1940; also Phaidon Press Renoir, 1952.

Renouvrier, Charles Bernard (1818-1903), Fr. philosopher, b. Montpellier. His first works were *Manuel de Philosophie moderne*, 1842, *Manuel de Philosophie ancienne*, 1848, and *Manuel républicain de l'Homme et du Citoyen*, 1848. He contributed to *L'Année philosophique*, and founded another paper called *La Critique philosophique*. Other works of R. are: *La Science de la Morale*, 1869, Victor Hugo, 1893, *Philosophie analytique de l'Histoire*, 1896, and *Histoire et Solution des Problèmes métaphysiques*, 1901.

Rent, money or other payment made for the use of land, and also for the use of houses or other buildings; i.e. it may be for the right to cultivate a given area, to occupy buildings on it, or to work minerals under it. It is therefore only a form of interest on capital. The older economists, while accepting this popular meaning, endeavoured to give the term more precision. They regarded R. as the share of production which accrues to the owner of the land, as opposed to interest and wages that accrue to the capitalist and the worker respectively. Ricardo elaborated a doctrine of R. based on the definition that it was the price paid for the use of the 'original and indestructible powers of the soil.' In theory R. is the amount which one will pay for land that is of greater value than no-rent land, as it is called. The net value of the crop produced on such land over the value of that produced on no-rent land will be paid by a tenant for its use, because the land is worth that much and no more to him; and the same principle is true of site values. This theory, however, requires qualification: as regards agric. land capital has been put into it in the shape of clearing, drainage, reclamation, buildings, etc., so that the R. is for the greater part interest on capital. In practice, it is impossible to differentiate between the original powers of the soil and those arising

from capital investment in improvements; while proximity to a market and suitability for alternative uses also enter into the question. R. may therefore be said to be simply a periodical payment made by the tenant or *de facto* user of immovable property to the landlord or owner of it. The origin and development of such a relation is a matter of hist.; its regulation is a matter of law. In the early Middle Ages rents were paid by services (ploughing the lord's soil; knight service, etc.) and payments in kind. When the money economy was introduced, the services, etc., were commuted, e.g. by scutage (q.v.). In this way originated the customary R.s, which became competitive R.s when agriculture was pursued for gain. Competitive R.s may become excessively high when agric. prospects seem especially good, as, for example, during the Napoleonic wars or when there is little or no alternative means of employment, as happened in Ireland, when as a consequence R.s had to be adjusted by Act of Parliament. Hence, under the Land Act, 1881, the Irish tenant was given fixity of tenure (subject to eviction for default), free sale, and 'fair' rent assessed by the land court, thereby instituting what was in effect a system of dual ownership. State control of free competition was introduced on a large scale during the First World War. R.s were restricted by special legislation and, after the war, increases in R. were regulated. Rent restriction was relaxed in the late 1950's. See also HOUSING; LAND LAWS; LANDLORD AND TENANT; RENT RESTRICTION.

Rent Restriction. In 1915, to deal with the changed conditions due to the First World War, it became expedient to restrict by law the power of landlords to raise rents. At first such legislation was only temporary, but the restriction has been continued ever since, with modifications, by a series of statutes (see LANDLORD AND TENANT). Rent tribunals were estab. under the Furnished Houses (Rent Control) Act, 1946. In 1956 about 6,000,000 out of 7,250,000 rented houses were rent-controlled. In some cases the rents were the same as in the 1920s. Rent control began as a measure of social justice; but after 40 years it has become a source of economic harm to the community. It increases the demand for housing beyond the amount that would be required if tenants had to pay the full economic cost of supplying accommodation. It encourages sitting tenants to occupy more space than they need. And it prevents those wanting accommodation for the first time (mostly the newly married) from finding accommodation at a rent they are prepared to pay. By depressing rents below the market level, it creates a shortage of housing. But in fact there is no shortage: after the Second World War there were fewer persons to each inhabited house than there were 40 years ago. Rent control also reduces the supply of houses and throws on to public authority the function of supplying them

at subsidised cost. Rent control has diverted labour and capital away from nationally more urgent needs in hospitals, factories, schools, and offices, and has contributed to the inflation of the post-war period. The Housing Repairs and Rent Acts of 1954 allowed house-owners to raise rents in order to enable them to spend more on repairs, but it has been much too small a measure to deal with a fundamental problem of disequilibrium. Gradually all shades of political opinion in the middle-1950s were coming round to the view that the only real solution was to remove rent control altogether; although, to avoid hardship, it would have been done in stages.

The first step in de-restricting rents was taken by the Rent Act, 1957 (which came into force in July). It removed control from: (a) houses with rateable values (in Feb. 1956) of over £40 in the Metropolitan Police Dist. and the City of London, or over £30 elsewhere in England and Wales; (b) owner-occupied houses let after the passing of the Act; and (c) all other privately owned houses when let to new tenants (except a widow or other member of the family succeeding a tenant who retained possession by virtue of the Rent Act, called a 'statutory tenant'). Houses with rateable values below these figures (except those becoming vacant and then let) remained under control, but the landlord was empowered to raise their rents. If he was responsible for repairs other than internal decorations, he could raise the rent to twice the gross value; if he was responsible for, or chose to carry out, internal repairs as well, he could raise the rent to 2½ times the gross value. If the tenant was responsible for internal repairs the rent could be raised to only 1½ times the gross value.

After some months it appeared that the adaptation of the market for working-class dwellings to the new conditions was proceeding fairly smoothly. Many occupants could afford to pay higher rents, although protests were not unnaturally made against having to divert expenditure from conventional (but hardly indispensable) purchases; it was widely pointed out that when large sums were spent on household amenities, on smoking, on drinking, and on gambling, it was no hardship to pay increased rents. Furthermore, many council houses had been built since the end of the War. Accordingly, the doubling of rents was in many cases sufficient to balance demand with supply. Indeed, in some areas a doubling of rents would have left some dwellings empty, and their rents were raised by less than the amount permitted by the Act. The statutory upper limit of rents thus became inoperative, and the need for any control of rents by Parliament was removed. Some hardship was experienced by older people who had occupied dwellings that had become too large when their children married. But the increases in rents were in many cases paid by increased National Assistance allowances. In the market for middle-class dwellings

(larger or better houses, or flats in privately built blocks), the adjustment to a free market was proceeding less smoothly. Many landlords of such dwellings did not raise rents to the full market level, either because they wished to avoid hardship to their tenants or because of the pressure of public opinion. The result was that the demand was concentrated on other dwellings where landlords were enabled to raise rents to higher levels. The problem was somewhat aggravated by the Conservative gov.'s 'dear money' policy, which made house purchase more difficult, and by the Labour party's threat to restore rent control, which resulted in some landlords selling rather than letting their properties.

Rent Tribunal, *see under* RENT RESTRICTION.

Ren-ton, vil. of Dunbartonshire, Scotland, on the R. Leven, in Cardross (q.v.) par. Formerly engaged in bleaching and printing calico, it now has light-engineering industries. The novelist Tobias Smollett was b. at Dalquhurn near by. Pop. 5000.

Renunciation, *see* REPUDIATION.

Renwick, James (1662-88), preacher and Covenanter, b. Moniaive, Dumfriesshire. He studied at the univs. of Edinburgh and Groningen (Holland), was ordained, and went to Dublin. In 1683 he crossed over to Scotland and preached at Dar-mead. The privy council of Edinburgh denounced him as a traitor, and he wandered about preaching and publishing manifestoes for some 5 years, concealing himself in caves. He refused to acknowledge James II's right to the throne, and was finally caught in Edinburgh and executed.

Repairs, *see* LANDLORD AND TENANT.

Reparation in Scots Law means the obligation which results from a wrongful or negligent act. The act itself is termed a 'delict' (q.v.).

Reparations, payments, in money or kind, by a defeated country in accordance with the demands of the victors. This expression was used particularly for the payments to be made by Germany after the First World War. The amount was left for later computation in the treaty of Versailles. Demands made in 1920 and 1921 (the London Conference of 1921 fixing a total of \$6600m.) proved unrealistic, and after a first payment in 1921 a moratorium was granted. In 1924 a new scheme, known as the Dawes Plan (q.v.), was agreed to. This failed, and in 1929 it was replaced by the Young Plan (q.v.), which fixed a total of \$7,000 million mar. payable in 59 ann. instalments, beginning with 600 million marks, increasing to 1,000 million, and then decreasing again. This scheme also failed, and in 1932 an international conference at Lausanne decided to cancel R.

The question of R. for war damages is intricate. After the war of 1870-1 France had to pay to Germany the relatively small sum of 5000 million gold francs. This very soon threw the Ger. economy into a state of disequilibrium, the after-effects of which were long felt.

If R. cannot be paid out of the gold reserves of the country concerned, they must be paid in kind, i.e. through exports of goods and services. This means that the debtor country must be able to make these exports and the creditor countries must be willing to receive them. This is the 'transfer' problem, widely discussed in the 1920s. In fact, the larger part of the R. then actually paid by Germany was met out of the Dawes and Young loans raised in allied countries, which later also helped Germany to rearm. One of the first who saw the mistakes of the R. policy was Mr (later Lord) Keynes, who gave a warning voice as early as 1919. Although in fact R. were only a small burden on the Ger. economy, they were a welcome pretext for nationalist political agitation which preceded the advent of the National Socialist regime.

The allies were determined not to repeat these mistakes after the Second World War. R. on this occasion were to be paid not out of *current production*, but by the transfer of technical productive *capital* equipment (industrial plant, installations, ships, etc.) to the war-devastated countries in order to accelerate their recovery. The principles to be applied were decided at the Moscow and Potsdam conferences, viz. that: (1) first and foremost Germany must be disarmed; (2) Germany should be treated as an economic unit; (3) no foreign credit was to be given to Germany for reparation purposes; (4) it were not to be taken from current production; (5) with certain exceptions, no payments were to be made in cash; (6) the standard of life in Germany should not be higher than the average standard in Europe; (7) R. must not prevent Germany from paying for essential imports. The Potsdam conference (q.v.) applied these principles in detail. Russia was to receive all R. from the Russian zone in Germany; also 10 per cent without compensation from the other zones and 15 per cent in exchange for various deliveries (and also Ger. assets in E. European countries), Russia to pay Poland her R. share. The other allies were to receive all R. coming from the W. zones (less 25 per cent for Russia) and Ger. foreign assets not allocated to Russia. Reparation questions between the allies (apart from Russia and Poland) were settled at Paris in 1945, where also the Inter-Allied Reparation Agency (for the distribution of Ger. R.) was estab. Policy, however, on such a subject cannot be final, but must be adapted to changing conditions. As economic unification of Germany was frustrated by Russia, the permitted level of industry in W. Germany was raised in 1947, and an additional number of factories was exempted from dismantling for R. in 1949. The Russians did not keep the Potsdam agreement in that they took R. out of current production. Italy had to pay \$100m. R. to Russia, partly from current production; Britain renounced her claim to R. from Italy in 1945. Russia is also receiving R. from Finland, Bulgaria, Rumania, and Hungary.

See J. M. Keynes, *The Economic Consequences of the Peace*, 1919.

Repatriation, return to their countries of origin of persons displaced therefrom as refugees or prisoners-of-war.

Repeal, formal abrogation of an Act of Parliament. Acts, however ancient, which remain unrepealed, are still law, and cannot, in strict theory, lapse by desuetude, however inconspicuous their provisions may be with modern conditions.

Repeating Rifle, see RIFLE.

Repertory Theatre, strictly a theatre with a permanent company and a repertoire of plays, such as the Comédie-Française. The oldest surviving R. T. in the U.K. is the Playhouse, Liverpool, founded in 1911. The Birmingham R. T., under the direction of Sir Barry Jackson, the first specially built theatre for the purpose, was founded in 1913.

The Cambridge Festival Theatre (1926-34), estab. by Terence Gray, specialised in modernist productions. In 1923 the Oxford Playhouse was founded. It has been reconstituted and rebuilt, and presents a range of plays varying from classic pieces to popular farce and comedy, and plays by new writers. James Iridie founded the Glasgow Citizen's Theatre in 1943, to present 'plays of artistic or didactic merit which would not otherwise be seen in Glasgow' in order to encourage a school of Scottish playwrights. There are other R. T.s at Bristol, Liverpool, Northampton, Sheffield, Nottingham, Bradford, and elsewhere. The Old Vic has a stock company for the performance of Shakespeare's and other plays. The Shakespeare Memorial Festival Theatre at Stratford-on-Avon is conducted on R. T. lines during the Shakespeare birthday festival (spring), and is followed by a summer season, when the permanent company gives a different play each night. The Arts Council conducts the Royal Theatre, Bristol, and the Arts Theatre, Salisbury, on a repertory basis, and is interested in repertory companies in Coventry and Swansea. The repertory companies listed by *The Stage* perform a different play each week, and so are not R. T.s in the true sense of the word. The famous Shakespearean touring companies of Sir Frank Benson and Ben Greet were true repertories.

See D. MacCarthy, *The Court Theatre*, 1907; P. P. Howe, *The Repertory Theatre*, 1910; Bache Matthews, *A History of the Birmingham Repertory Theatre*, 1924; St J. Krivine, *The Organised Theatre*, 1924; A. Nicoll, *The English Theatre*, 1936; and N. Marshall, *The Other Theatre*, 1946.

Repetition, as a figure of speech, is used to give expression to intense feeling, as in Coleridge's lines:

'Alone, alone, all all alone,
Alone on a wide wide sea.'

When it has no rhetorical effect it becomes tautology (q.v.). See also FIGURE OF SPEECH.

Répin, Ilya Yefimovich (1844-1918), Russian painter, b. Tschuguev. He studied at the Academy of Fine Arts,

St Petersburg, for 6 years, and then travelled in France and Italy. In 1894 he was appointed prof. of historical painting at the St Petersburg Academy. He painted scenes of misery in propagandist vein, e.g. 'The Return from Siberia,' and of vigorous barbarism ('The Cossacks jeering reply to the Sultan'). His portraits of Tolstoy were much commended.

Repington, Charles A. Court- (1858-1925), soldier and military critic, b. London, and educ. at Eton and Sandhurst. He served in Afghanistan, Burma, the Sudan, and S. Africa. R. was military correspondent of *The Times*, 1911-18, publishing the sensational message on the shell shortage which opened the way to a political crisis. In 1920 he pub. *The First World War*, which suggested that war policies had been worked out against a background of social manipulation and personal relationships, and caused a sensation upon pub.

Replevin (O.F. *re*, again; *plevine*, warranty), whereby a person distrained upon has the distress returned into his own possession, upon giving security to try the right of taking it in an action, on condition that if the action goes against him he will return the cattle or goods once more into the hands of the distrainer.

Reporters and Reporting, see JOURNALISM; NEWSPAPERS.

Repoussé (Fr. 'beaten back'), term generally employed in connection with metalwork, by which a pattern or design is hammered from the inner side of the object to be decorated, the design being perfected on the outside by means of chasing tools. The early Egyptians and Etruscans largely practised this work. There are also notable Celtic examples. The finest specimens were made in the 16th cent. by Benvenuto Cellini (q.v.). Good examples have also been produced in France.

Representation. In theory government by R. gives the representatives chosen a wider mandate than that granted to ordinary delegates or to the holders of proxies. Since the end of the 19th cent. the representative system has been frequently criticised, and in many countries it has been modified by proportional R. (q.v.) in parl. and other elections, and the referendum (q.v.). See ELECTORATE; PARLIAMENT; JURY.

Representatives, House of, lower house of the congress of the U.S.A. and, later, applied to the lower house of other bicameral legislatures. The membership of the Amer. H. of R. varies in number from time to time, being determined by the decennial census, in the absence of specific congressional legislation affecting the basis (see UNITED STATES OF AMERICA). The elected chamber in the Parliament of the commonwealth of Australia (q.v.) is also called the H. of R., the numbers of members chosen being in proportion to pop. as shown by the latest statistics, but not less than 5 for an original state. Similarly, there is a H. of R. in New Zealand, the members of which are elected for 3 years. Other

countries with a bicameral legislature whose constitutions provide for a H. of R. include Colombia, Cuba, the Philippines, and Uruguay. The title H. of R. is synonymous with Chamber of Deputies, the name given to the lower house of Bolivia, Chile, the Dominican Republic, Ecuador, Egypt, Peru, and Venezuela. The former Chamber of Deputies of France is now replaced by the National Assembly.

Repression, see PSYCHOLOGY.

Reprieve, withdrawing of a sentence for an interval of time whereby the execution of a criminal is suspended, and may be granted either (a) by the Crown through the Home Office, or (b) by the court, either before or after verdict. The grant of a R. is an entirely discretionary matter, but in 2 cases the court has no option, and must grant a R., viz.: (1) when a woman sentenced to death is pregnant; (2) when a prisoner becomes insane after judgment. See also PARDON.

Reprisals, internationally illegal acts to which by a rule of convenience of international law (q.v.) a state may resort in order to secure justice when it is otherwise not obtainable. If, for example (to argue from an actual case), one state has granted a monopoly in violation of a commercial treaty (q.v.) with another state, the latter may retaliate by seizing the vessels of the former and laying an embargo upon them. The moral justification for R. against a state is that the difference which is settled by such a quasi-belligerent mode of proceeding is a difference created by that state's own international delinquency, and, according to the better opinion, R. are admissible solely for international delinquencies (Oppenheim). Like pacific blockade (see on this, Westlake, *Collected Papers*, 1914) and retorsions, they fall short of actual war, though it is doubtful whether they would not inevitably be followed by a declaration of war from the state against which they were directed, if that state were a modern civilised power. But, as a rule, R. and analogous retaliatory acts have been committed only against minor states. Retorsion is distinguishable from R. in that it consists in retaliation in kind for unfriendly or inequitable acts which are not at the same time illegal in international law. It is an express provision of The Hague Convention that any compulsion of the pop. of occupied ter. to give information about the army of the other belligerent or about his means of defence is forbidden (Article 44, Hague Convention IV, 1907). This rule is an extension of Article 23, which prohibits the compulsion of enemy subjects to participate in the 'operations of war' against their own country. The prohibition is vague, but it was a harsh extension of its meaning which the Germans claimed when they deported thousands of Belgian and Fr. men and women to Germany and compelled them to work there. In the Second World War the Germans carried R. beyond all laws, moral and international.

Reproducer, see GRAMOPHONE.

Reproduction, in biology, process by which individuals generate new individuals of the same species. All Metazoa are made up of cells, and all cells are produced by the division of pre-existent cells; this is the ordinary phenomenon of growth. Many organisms have the power of developing new structures to replace parts which have been lost (see REGENERATION). Again, most organisms possess special cells which, in certain circumstances, may develop into complete individuals. It is this latter process which is specifically called R. R. may be *asexual* or *sexual*. Asexual R. may be by fission, i.e. the division of an organism into 2 parts, each part developing into a complete individual. The commonest mode of asexual R., however, is budding, in which a portion of the organism is constricted and grows into a new organism, which may separate or remain attached to the parent. Sexual R. involves the production of a cell called a zygote by the conjugation of 2 cells called gametes. The gametes may be sexually indistinguishable, in which case the conjugation is said to be *isogamous*. In heterogamous conjugation, which is far commoner, a male gamete, called a spermatozoon, fuses with a female gamete, called an ovum. Reproductive organs are differentiated for the production of the gametes, and when these are possessed by different individuals there occur male and female sex. The conjugation of male and female elements is called fertilisation (q.v.). When the ovum develops without fertilisation, the phenomenon is known as parthenogenesis; this occurs in bees and in many plants. Many plants have an asexual mode of R. by the formation of spores. See BIOLOGY; CELL; EMBRYOLOGY; PENIS; PLANTS; SEXUAL SELECTION; VARIATION.

Reptiles (*Reptilia*), class of vertebrates which has much in common with birds, and included with them by Huxley in the primary group, Sauropsida, reptile-like animals. R. are cold-blooded, and have the skin covered with scales or scutes. They are oviparous or ovoviviparous, and are all air-breathers, which distinguishes them from the Amphibia. And unlike most amphibians, reptiles are born in the adult form: there is no metamorphosis from a tadpole stage. According to herpetologists, the 5 chief groups or orders of existing R. are: Chelonina, tortoises and turtles; Lacertilia, lizards; Ophidia, snakes; Rhynchocephalia, represented by a single New Zealand lizard (*Sphenodon*); and the Crocodilia. R. reached their maximum development in an earlier geological period, and the Mesozoic era is sometimes called the Reptilian Age, hence fossil forms are very numerous.

Repton, par. and vil. of Derbyshire, England, on the R. Trent, 8 m. WSW. of Derby. Here is R. School (q.v.). The kings of Mercia had a palace at R., and 3 kings were buried at the monastery there. The par. church contains a Saxon crypt. Pop. 2300.

Repton School, public school for boys, founded in 1557 under the will of Sir John Port of Etwal, Derbyshire, and started in the remaining buildings of Repton priory (estab. by Augustinians in the 12th cent.) which still form a central feature of the school. It was re-organised in 1874.

Republic (Lat. *respublica*, the state; from *res*, affair, and *publica*, public), state in which the sovereignty does not reside in an hereditary ruler, but in the people themselves, or a section of them. Thus a R. may be aristocratic, oligarchic, or democratic. The earliest R.s, those of Greece and Rome, were oligarchic, as were the medieval R.s of Venice, Florence, Genoa, and other It. tns. Great Britain was from 1649 to 1660 a R. in name. France has been a R. from 1793 to 1805, from 1848 to 1853, and from 1870 to the present time. Mexico has been a R. from 1824 to 1863, and from 1867 to the present time. Spain has been a R. from 1873 to 1874, and again from 1931; Portugal from 1910, present Poland from 1916, Russia from 1917, China from 1912, Germany from 1918, and Italy from 1945. With the exception of the 3 Guianas, all the S. Amer. states are R.s. San Marino and Andorra are the smallest R.s. Switzerland, W. Germany, and the U.S.A. are *federal* R.s. Legislation is vested in 2 co-ordinate Houses, while the judiciary forms a separate branch of gov., invested with power to pronounce on the constitutionality of laws and of executive Acts. See CONSTITUTION.

Republican Party, one of the two major political parties of the U.S.A. The name was originally used as a second name for the Democratic party (q.v.), founded by Jefferson. In 1828 a group under John Quincy Adams and Henry Clay seceded, styling themselves 'National Republicans' or 'Whigs.' The modern R. P. was founded in 1854 by a union of N. Whigs, Democrats, and Independents, all of whom were opposed to slavery. In 1856 it held its first national convention at Philadelphia, and nominated John C. Fremont for the presidency. James Buchanan, Democrat, was elected, securing 174 votes, but the R. P. received 114 for its nominee. In 1860 the R. P. succeeded in securing the election of Abraham Lincoln (q.v.). After the civil war the R. P. was the dominant party in the country. It controlled the presidency and Congress till 1874, when a Democratic House of Representatives was returned, but retained the presidency until Cleveland's election in 1884. The R. P. was again in power from 1888 to 1892. In 1896 the party controlled Congress and the presidency once more. It was only the Roosevelt secession of 1912 (see BULL MOOSE) which enabled the Democrats to gain control of Congress and secure the election of Woodrow Wilson; but a Republican Congress elected during his presidency blocked many of his measures. In 1920 the R. P. regained the presidency and kept it until 1932. In 1932, 1936, 1940, and 1944 a Democrat was returned

to the presidency (Franklin D. Roosevelt (q.v.)), and in 1948 another Democrat was elected (Harry S. Truman (q.v.)). The R. P. returned to power with D. W. Eisenhower as their leader in 1952; President Eisenhower was re-elected in 1956.

For years after the civil war the R. P. profited by the claim that it had saved the union, though many N. Democrats had fought beside N. Republicans during the struggle. Later the two parties appeared to be distinguished chiefly by their attitudes on currency and tariff reform. Cleveland stressed a tariff for revenue only, while the R. P. generally wanted a high protective tariff to aid Amer. manufs. Following the civil war, the R. P. also tended to support the strengthening of the central gov. as against the local spirit of the separate states, since the S. states took every advantage of federalism to salvage something from their defeat in the war.

After the initiation of Roosevelt's New Deal (q.v.) the Republicans, while continuing their campaign against 'state rights,' emerged as a party opposed to the centralisation implicit in the 'welfare state'; in this view, however, they were followed by a considerable section of the Democrats.

At the end of the First World War the R. P. opposed the entry of the U.S.A. to the League of Nations. Since the Second, its more right-wing elements have been more eager than the main body of the Democrats to participate in specific spheres of international politics where the paramount objective has been the prevention of Communism, e.g. China. Therefore, even on foreign policy, the two parties have no rigid dividing line, though more elements of isolationism survive within the R. P. than within the Democratic. As the opposition, the R. P. after 1944 was more anxious to criticise lavish gov. expenditure than the Democratic, and some Republicans frequently objected to the granting of large-scale loans to Socialist countries, though their more moderate leaders, e.g. Vandenberg (q.v.), generally approved presidential policy on these matters. Under the Republican President Eisenhower these policies were continued with little change.

It is hard to distinguish between the R. P. and the Democratic on broad political questions. The R. P. has gained much support from big business because of its tariff policy; the Democrats have won many industrial workers' votes since the Roosevelt administration's New Deal. But voting in America is based to a large extent upon locality, historical association, and (particularly in presidential elections) on personal appeal, and both parties contain 'left' and 'right' groups, and rarely vote as a body, except when in opposition. In addition, large groups within the U.S.A., e.g. Prohibitionists, Unions, Baptists, Rom. Catholics, have frequently played off one party against the other in order to obtain a large part of their own programme from both. See DEMOCRATIC PARTY.

Republican River, formed by the confluence of North Fork, Republican, and Arikaree rvs. at Haigler, SW. Nebraska, U.S.A., and flowing E. and SE., joining Smoky Hill R. to flow to Junction City, Kansas, where it forms Kansas R. Length 422 m.

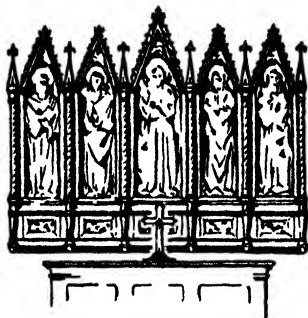
Repudiation, or Renunciation. In the law of contract a party who repudiates the contract before the time for performing it has come thereby commits a breach which entitles the other not only to consider himself discharged from doing anything under the contract, but *at once* to sue for damages or specific performance (see EQUITY).

Requena, Sp. tn in the prov. of Valencia. It has a ruined castle, and anc't churches and mansions. The dist. produces wine, fruits, oil, silk, and saffron, and there is a spa near by at Fuente Podrida. Pop. 19,800.

Requiem (Lat. *requiem* (acc.), rest), celebration of the Mass for a person or persons departed. The name is derived from the first words of the introit, *Requiem aeternam dona eis, Domine* (Eternal rest give unto them, O Lord).

Requisition, Military, see LAND FOR MILITARY PURPOSES.

Reredos, in churches, ornamented wall or screen at the back of the high altar. It usually consists of a screen detached from the wall, and is elaborately adorned



REREDOS

with sculpture and tracery or painting. Originally the R. was a hanging of tapestry or silk; later it became more substantial, but could still be moved, and was used only at certain festivals.

Heremouse, see BAT.

Res Judicata, in law a question which, having been settled by a final judgment, is disposed of for all time. No question of fact that has once been finally determined in a legal tribunal can ever be reopened in a court of law. But a final recorded judgment is evidence only of the actual state of facts it purports to settle, and not of every piece of evidence that might or might not have guided the court in its decision, though it is conclusive

evidence of facts which are necessarily imported in the judgment; and again, a final judgment is only final as between the original parties to it or their successors, no stranger to the suit being barred from getting the same issue set down for trial.

Resale Price Maintenance, the practice by which manufacturers stipulate and attempt to enforce prices to be charged for the resale of their (usually) branded goods by wholesalers and/or retailers. There has been a great deal of discussion on this practice in the post-war period, particularly in view of the increasingly critical attitude towards restrictive practices of any kind.

In 1931 the Greene Committee on Restraint of Trade reported that, while this practice had disadvantages for the public interest, it did not think that a change in the law would serve the public better. Such a negative and fatalistic attitude was perhaps not unexpected in the prevailing conditions of economic depression and falling prices, when security of sale and employment seemed more immediately important than competition and the avoidance of monopoly. But in 1949 the Lloyd Jacob Committee on Resale Price Maintenance took up quite a different stand. It was satisfied 'that the elimination of price competition is not consistent with . . . maximum efficiency and economy'; it was concerned to mitigate the harmful effects of R. P. M. and to ensure that the distributive system was flexible. Accordingly, it recommended that enforcement of the practice by groups of manufacturers, e.g. in trade associations, should be abolished. It also recommended that an individual manufacturer be permitted to prescribe and enforce retail prices for goods bearing his brand names; but it made it a condition of such freedom for individual resale price that it should not restrict the development of newer methods of retailing or prevent costs and prices being reduced. But it was widely considered that this was an internally inconsistent recommendation, since R. P. M. was in fact having the consequences which the Committee considered were grounds for preventing it. Experience in America suggested that R. P. M. in Britain had restricted the development of self-service, self-selection, and other newer methods of retailing which reduce the element of 'service.' It had also been argued that R. P. M. kept costs and prices higher than they could be by keeping in being retailers with high costs due to inefficiency or unavoidable circumstances such as poor site, etc.

In 1956 the Restrictive Trades Practices Act outlawed collective price maintenance in principle (although there was provision for appeal to a Court), and strengthened the power of an individual manufacturer to enforce, in a Court of Law, his own retail prices. The Act thus put on the Statute Book the approach of the Lloyd Jacob Committee. It remained to be seen how far the power of

the individual manufacturer to enforce prices negated the inability of a group of manufacturers to enforce one another's prices collectively. It had been suggested that firms which consider that price maintenance was desirable might find means of working more closely together so that in the eyes of the law they formed one firm and were thus able to enforce their prices. If this happened, the Act of 1956 might increase combination in industry both vertically (by manufacturers controlling retail outlets) and horizontally (by manufacturers joining together to enforce resale prices on independent distributors). See PRICE; MONOPOLY; B. S. Yamey, *The Economics of Resale Price Maintenance*, 1954; *Report of the Monopolies Commission on Collective Discrimination*, 1955.

Reschenscheldeck, see RESIO, PASSO DI.

Rescripts (Lat. *rescriptum*, answer), in Rom. jurisprudence, answers of the emperors to questions officially put to them. During the early empire they constituted one of the most important sources of Rom. law. During the 3rd cent. they rapidly increased and superseded the responses of the jurists, the privilege of giving such no longer being conferred on the latter. For papal R. see DECRETAL.

Rescue: 1. In law, forcibly and knowingly freeing another from arrest or imprisonment. If the original offenders be convicted, the rescuer will be punishable as for the same offence; if not convicted, the rescuer may still be punished as for a misdemeanour. To R. or attempt to R. a convicted murderer renders the offender liable to life imprisonment. For *Pound Breach*, see BREACH.

2. Deliverance from danger or death. R. work is carried out by a number of organisations specially equipped for certain types of emergency (see below). Organisations such as the various vigilance societies, church groups, and the Salvation Army conduct 'moral R. work,' campaigning against prostitution (q.v.), drunkenness (q.v.), etc.

Fire Rescue. The primary duty and purpose of every fireman is to save life: the saving of property is a secondary consideration. Each item in the varied equipment, from a small hand axe to a 150-ft turntable ladder, may play an important part in the saving of life from fire. The methods of effecting a rescue vary according to circumstances. It may be necessary only for a fireman to enter a building, calm distracted occupants, and lead them to safety by a safe route. Generally, however, lives are saved by firemen using ladders (see under FIRE BRIGADES AND FIRE FIGHTING) to gain entry above the ground floor when staircases are obstructed by fire or, more commonly, smoke. In order to enter a building which is filled with smoke or toxic fumes, a fireman may use breathing apparatus (see OXYGEN APPARATUS).

Mines Rescue. The Coal Mines (Rescue) Regulations require Central Rescue Stations to be provided and main-

tained in all the coalfields of the U.K., and there are in all 31 such stations. These are situated so that they can operate all collieries within a radius of 15-20 m., and are fully equipped ready for immediate action with a sufficient number of fully trained rescue men readily available. Two types of self-contained breathing apparatus are used in rescue work, one employing compressed oxygen and the other liquid air. Each can be worn for a duration of 2 hrs, which is the maximum time a rescue man can operate wearing the apparatus.

Civil Defence Rescue. The air attacks on civilian pops. during the Second World War necessitated the opening of new fields in lt. work. No highly complicated or technical apparatus was required, except a sound knowledge of the use of shoring damaged buildings, tunnelling under debris, etc., in order to reach and give aid to the victim.

For maritime R. work, see LIFE-SAVING AND RESCUE APPARATUS; for rescue from drowning, see HUMANE SOCIETY, THE ROYAL, and SWIMMING; for moral R. work, see VIGILANCE SOCIETIES.

Research Associations, Industrial. The growth in importance and numbers of these associations and their increasing influence on the scientific and economic life of the country are a striking feature of modern industry. The total income of these associations in 1955 was just over £5m., of which £1,422,000 was provided by grants from the Dept of Scientific and Industrial Research. The gov. scheme for co-operative industrial research was initiated by that dept in 1918, its purpose being to stimulate the industries of the U.K. to undertake co-operative research as a means of increasing their efficiency. R. A. under this scheme are registered companies, limited by guarantee of a nominal sum and working without the div. of profits in the form of dividends; their income is from subscriptions of individual members, supplemented by gov. grants. There are now 45 R. A. covering most of the prin. industries of the country. They are autonomous bodies free to decide their own policy for the development of their research programmes and the use to be made of the results of their research. Membership is open to any Brit. firms in the particular industry, subject to the approval of the Council of the Research Associations.

Reseda, genus of dicotyledonous plants, typical of the family Resedaceae, and found in Europe and round the Mediterranean. Two species occur in Britain: *R. luteola*, the dyer's rocket or weld, and *R. lutea*, the wild mignonette. *R. odorata* is the common garden mignonette (q.v.), which is cultivated for its sweet-scented flowers.

Reservation of the Blessed Sacrament, practice of keeping the consecrated elements after the eucharist for administration to the sick and for purposes of devotion. It goes back to the earliest Christian times, when portions of the eucharistic bread were sent or taken by

the deacons to the sick and absent (Justin Martyr, *Apol.* i. 87). Tertullian uses the word *reservare* in the sense of retaining the Blessed Sacrament (*De Orat.* xix). On the other hand, the practice of keeping the Blessed Sacrament in churches, and of devout prayer before it, cannot be traced with certainty farther back than AD 1000. After the 10th cent. the common practice was to suspend the Blessed Sacrament over the high altar, sometimes in a dove-shaped vessel. The tabernacle of modern times was known, but not common, before the Reformation. After the Reformation R. was not practised outside the Rom. Catholic Church and the Orthodox Church until fairly recent times. It is a growing practice in the Anglican Church among the High Church party, but determined efforts are made to discourage public veneration of the sacrament, partly by episcopal insistence on the use of aumbries in the N. wall of the sanctuary for the purpose. According to the legal authorities, R. seems to be unlawful in the Church of England, being excluded by certain rubrics in the Prayer Book. See also H. Thurston in *The Month*, 1907, 377 and 617; W. H. Freestone, *The Sacrament Reserved*, 1917; G. Dix, *A Detection of Aumbries*, 1943.

Reserve (Reservation), areas reserved for occupation by natives, especially Africans and Amer. Indians. In Brit. African terr. other than those mentioned alienation has had relatively less effect on native life, as, for example, Nyasaland, though R.s may also be seen there. There are none in W. Africa, where conditions demographically are entirely different. The principle of segregation has 2 purposes: the reservation of land for European occupation and the eventual exclusion of the native from European-owned lands, save for his employment as wage-earner or tenant labour. Segregation here may be said to be in full operation in the sense that the limits of European and native areas respectively have now for some years past been fixed; but there is not complete territorial separation, for the holdings of the 2 communities are in most cases intermingled. In the Union of S. Africa the Transkei Terr. and a part of Zululand may be said to constitute homogeneous native blocks; in S. Rhodesia there are some large blocks of native land, but a number of R.s are interspersed in European areas; but the highlands of Kenya constitute a more or less homogeneous European block.

In the Union of S. Africa the land set aside as R. is that which was originally occupied by the Bantu. In the Kenya R.s are those hereditary tribal lands which were not acquired by treaties or by concessions by Europeans. In the Union of S. Africa the early Dutch purchased from the Hottentots land extending to the Hottentots' Holland mt range from the Cape Peninsula. The Bantu were not dispossessed in S. Africa; like the Europeans, they were an immigrant people, and the first settlers did not make contact with the Bantu in any numbers until they clashed

along the Great Fish Riv. about 1610. There is no substance in the commonly held view that the Bantu are aboriginal to S. Africa.

Of the 9,000,000 Bantu in S. Africa, 42 per cent live in R.s. 40 per cent of the total area of the R.s, which cover 56,000 sq. m., have an average ann. rainfall of more than 30 in., and 33 per cent get from 20 to 30 in. of rain. In terms of food-producing potential of the R.s, they contain much of the best part of S. Africa. Because of the wide disparity in rainfall throughout S. Africa, comparison of areas as between those occupied by Europeans and those occupied by Bantu is misleading, as more than half S. Africa is semi-desert. Owing largely to bad husbandry, much of the R.s have suffered seriously from soil erosion. Energetic steps are being taken towards agric. rehabilitation and soil reclamation. From £1,500,000 spent for these purposes in 1947 the amount rose to £3,500,000 in 1953. About 20,000 ac. of forest plantations have been estab., and a further 350,000 ac. of indigenous timber is protected. In addition, more than 1000 storage dams had been built by 1955, 2000 bore-holes sunk, 7700 m. of fencing erected and about 6000 m. of earthen contour banks constructed. More than 2000 good-quality bulls have been brought into the R.s to improve Bantu dairy stock. The *Tomlinson Report*, 1956, and discussions following its pub. exhaustively examine future plans for the R.s and should be closely studied by students.

Opinion in S. Africa tends to lay emphasis on the existence of the R.s as a factor in the policy of segregation (or *apartheid*) rather than on the influence it may have on the supply of labour. The policy which regards the reserves as the suitable field within which the native is to work out his social and economic advancement is in some quarters merely a doctrine of expediency, but in others it represents a genuine belief that the native can in this way secure for himself the best position available to him under the conditions introduced by a dominant and competitive white civilisation; but against this it is held by some that the R. can offer only limited possibilities for any substantial improvement in the conditions of those who live in it; and in some of the R.s there is marked congestion. See also SOUTH AFRICA, UNION OF.

On the R.s in Kenya see KENYA, *White Settlement*. On Indian reservations in America see AMERICAN INDIANS, *Conditions on Reservations*. For reservations for animals, etc., see GAME RESERVES; NATIONAL PARKS.

Reserve Army. The principle upon which modern military systems are based is that, for financial reasons mainly, states cannot maintain in peace the number of troops they would require in war. They therefore give soldiers the training they consider necessary to fit them for war, and then pass them to a reserve force, where they complete their service. Whilst in this reserve they perform ann. training to

keep them up to standard. In Great Britain the R. A. now comprises the Army Emergency Reserve and the Territorial Army.

The Army Emergency Reserve in its present form came into being in 1950. It consists in the main of specialist or technical units. It is recruited by voluntary enlistment for periods of 2-4 years. The Army Emergency Reserve's predecessors have been the Special Reserve formed in 1908 from the Militia (q.v.) and the Supplementary Reserve estab. in 1924. The Special Reserve was renamed the Militia in 1921. No attempt was made to enlist personnel for it after the First World War, but it was not formally abolished until 1953. Its successor, the Supplementary Reserve, was discontinued after the Second World War. The other section of the R. A. is the Territorial Army (q.v.).

Reserved Occupation, in relation to military service. At the beginning of the Second World War, as also under the Derby scheme of recruiting (see CONSCRIPTION) and in the First World War, there was a schedule of R. O.s, which provided for a wide variety of men in different occupations whose call up for military service was deferred according to their particular age group. In the Second World War that plan operated until about the end of 1941, when the gov. gradually dropped the system of 'block reservations' or deferments and introduced a system of individual deferments according to the importance of the man concerned to industry. The system provided for exchanging men; thus an elderly worker would be put into the place of a key worker of younger age. After 1946 coal-mining, agriculture, and certain occupations connected with the building industry were the only R. O.s; and after 1 Jan. 1947 deferment, broadly speaking, was according to the circumstances of particular cases and not on the grounds of their importance to industry. In Mar. 1950 all control of engagements was ended. See *Report of the Ministry of Labour and National Service for 1939-46*.

Reservoirs for storage of water are classed as 'storage' or 'impounding' R. when they are intended to store up water during wet weather for use during drought, and as 'service' R. in the case of comparatively small covered R. supplying purified water by gravity to towns.

Storage or Impounding Reservoirs. Wherever possible natural lakes are adapted, but where they do not exist artificial lakes may be created in a natural drainage area by constructing a dam across some portion of a valley; in more level plains advantage is taken of depressions as sites. The main consideration of cost of constructive work is naturally a great factor in the choice, and the geology, as well as the configuration of the land, must be carefully surveyed, as it affects not only the retention of the water, but also determines largely the cost of labour. A synclinal valley is a favourable site, as water would percolate through

the strata into the reservoir; an anticlinal valley would allow leakage. Again, sand, gravel, or limestone forms a leaky substratum unless artificially covered, while a clay bed, naturally, is excellent. The supply of water must be carefully calculated; a natural 'catchment basin' is mapped out; its rainfall noted both as to quantity and period; the quantity of water carried by the streams and its fluctuation measured. In hilly country the height of the reservoir site needs careful selection; too high a position not only requires greater strength in all delivery pipes owing to increased pressure, but the supply of water is more sensitive to rainfall, thus giving a precarious supply at one time, while flooding, necessitating expensive construction work, will occur at another; a lower site, avoiding periodic scanty supply, may yet allow flooding, and be still open also to the disadvantage of the great eroding force of supply water. The lower the site the better, so long as sufficient pressure can be maintained. The purity of water depends on many factors, but it is greater as a rule the higher the site and the more remote from populous districts. The supply may, however, be brought from a region by aqueduct to a reservoir in an economically selected site. On plains R. may be constructed alongside rivers, from which the water is pumped. The retaining walls or dams are built of earth, masonry, mass concrete, reinforced concrete, and other building materials. Earth forms a most substantial dam, is economical, and decidedly better than masonry in countries subject to earthquakes; it is not used on solid rock foundation or in dry climates. In America the wider variety of climate has led to many devices. Loose rock is piled up with careful filling of interstices; it may contain a vertical steel diaphragm or one of reinforced concrete. The whole is then sheathed with tarred planking or covered with earth or masonry. Crib dams, formed of a framework of logs, bolted or wired, filled with loose rock, are used, but are naturally not permanent.

Earth Dams. This type may be built in layers of homogeneous material, with a core of puddled clay. The inner slope is usually 3 to 1, the outer 2 to 1, the latter often with one or more benches or berms as extra security against slipping. The core is founded on an impervious foundation and reaches to the top of the dam. The core is embanked on either side with selected earth carefully laid and worked. The inner face of the dam is carefully pitched with cobblestones, paving, or concrete slabs, to protect it against erosion—the pitching being stronger in the upper portion, where wave action is strong. Here the bank is usually steeper, so that spray recoils instead of topping the parapet and falling on the outer slope. The outer slope is usually covered with grass to bind the surface and protect it against weathering and spray.

Masonry and Mass-concrete Dams. These must be on absolutely firm foundations, or future settling may lead to cracks

or fissures. Their stability and the form for resisting water pressure are a matter of calculation. The weight of material itself must be considered, and extra pressure due to wind action as well as for varying level of water. The limits of pressure are found for the full and empty reservoir. In cross-section the wall is so arranged that the centre of pressure at any level shall be within the middle third of the thickness of the wall.

Reinforced-concrete Gravity Dams. These consist of a slab of reinforced concrete inclined at 45° to the horizontal and supported from a raft foundation by reinforced-concrete wing walls. The downward thrust of the water holds the dam in position and prevents the comparatively light structure from overturning, but precautions against sliding of the dam are essential.

Arched Dams. Such dams are made of mass concrete or other material, and are constructed between the vertical or steeply sloping rock sides of a valley against which the ends of the dam abut.

Waste-weirs. These are provided to carry off surplus water. They are constructed in solid ground at the side of the earth dam, or may be solid masonry structures at the end. In any case, it is usual to arrange both ends of the waste-way, escape, or spill-way well clear of the dam; with masonry dams the parapet may be so constructed as to allow of waste along the whole length; or any portion may be so constructed. The ogee shape is sometimes used, or a stepped fall, or a wide-crested fall. It is not usual to have any obstruction whatever, though various forms of sluice-gates are used to regulate the height where seasonal fluctuation is great. Fly-wash channels are used when for any reason it is desirable to divert water from streams entering the reservoir. Regulation is supplied by means of sluice-gates, or sometimes, when flood-water is to be excluded, automatically by a gap leading into the supply tunnel; beyond the gap the stream course is continued at a lower level, and the flood waters leap to this.

Outlet. The sluices may be laid through the dam or through the ground outside—a safer plan; or, best of all, through the solid foundation below the dam. The pipes are usually laid in culverts to allow frequent inspection, and lead from a suitable depth in the reservoir, say two-thirds up the embankment. From this level a separate siphon-pipe may lead to the bottom for use if necessary. The valve or lower chamber, where the water may be admitted from the reservoir, leads to the upright pipe leading to the outlet sluice; these control devices are built away from the dam, a small bridge leading across. The lower may contain screens for straining the water.

See also WATER SUPPLY; CATCHMENT AREA; and under HYDRO-ELECTRIC POWER.

See W. P. Creager, *Engineering for Masonry Dams*, 1929; F. J. Taylor, *Modern Waterworks Practice*, 1929; Institute

of Civil Engineers, *Interim Report of the Committee on Floods in Relation to Reservoir Practice*, 1933; G. Bransby-Williams, *Storage Reservoirs*, 1937; Institute of Civil Engineers, *Code of Practice for the Design and Construction of Reinforced Concrete Structures for the Storage of Liquids*, 1938; Institution of Water Engineers, *Manual of British Water Engineering Practice* (2nd ed.), 1954.

Ret, in Scots Law, is the crime of receiving or retaining goods knowing that they have been obtained by theft, robbery, fraud, or embezzlement.

Resalt, see RASHT.

Resia, Passo di (Ger. Reschenscheldeck), Alpine pass, on the Austro-It. border, just E. of the Swiss frontier. It lies between the Rhaetian and Ötztal Alps, at the watershed of the Inn and the Adige rivers. (q.v.). It is crossed by a road which runs from Malles to Venosta, in the It. prov. of Bolzano (q.v.), to Nauders, in the Austrian prov. of Tirol (q.v.). The route was known in pre-Rom. times. Altitude 1945 ft.

Residence, see DOMICILE.

Residuary Legatee, see LEGACY.

Resilience, term used mainly in engineering to describe the work done by a body, after it has been subjected to stress, in returning to its original shape, or the work done to produce this stress in a body within its elastic capacity. See ELASTICITY.

Resin, an amorphous solid or, occasionally, semi-solid substance obtained chiefly as an exudation from certain plants following injury to the tissues. The secretion exudes in globules or tears, which harden on exposure to the air. Some are also found as fossils, e.g. amber, copal, and kauri (q.v.). R.s. are mostly of yellow or brown colour; they have no tendency to crystallise and no definite melting point. They are usually soluble in alcohol, ether, chloroform, and the volatile oils, but insoluble in water; they are readily fusible and inflammable, and become electrically charged by friction. The hard R.s. are chiefly used in making varnishes and lacquers, and include: copal, kauri, acroïdes, manilla, dammar, sandarac, mastic, elemi, penak, and benzoin. Other R.s., and the manuf. in which they are used, are: amber, for resistant containers and apparatus for chemicals; colophony (q.v.), for oilcloth, linoleum, size, and soap; podophyllin and scammony (q.v.), as emetics and purgatives; gamboge, of bright orange-yellow colour, as a pigment; yacca, a red or yellow R., in dyes and photographic chemicals; and pontianic, in rubber and chewing gum. Oleo-resins are mixtures of plant R.s. and essential oils, and may be normal plant products or result from incisions made in the plant tissue. They are known as balsams, and include myrrh, frankincense (olibanum), opopanax, and styrax (storax), and are used for the production of perfumes and medicinal ointments. See also PLASTICS; PAINTS; VARNISHES.

Resina, It. tn. in Campania (q.v.), on the Bay of Naples (q.v.), 4½ m. SE. of

Naples. It is at the W. foot of Vesuvius (q.v.), and from here the railway runs up to the Vesuvian Observatory. The ruins of Herculaneum (q.v.) adjoin the tn. R. is the centre of the production of the *Lacrimae Christi* wine. Pop. (com.) 39,000.

Resistance of an electric circuit, the ratio under steady conditions (direct current) of the voltage across the circuit to the current. R. is measured in ohms, 1 ohm = 1 V/1 A. The R. of a wire or bar of uniform cross-section S , length l , is $R = \frac{\rho l}{S}$ where ρ is the resistivity or

specific R. of the material. See OHM'S LAW; UNITS, ELECTRICAL.

Resistance Furnaces, see METALLURGY.

Resistance Movements, term which came into use in the Second World War to denote the underground organised resistance of the peoples of European countries occupied by the Germans. Such resistance took the form of irregular fighting forces, such as the *maquis* of France or the *partisans* of Russia or Yugoslavia; but the term may also be said to embrace purely civilian activities, such as in Belgium, where an underground press was estab. to place on record the robbery and pillage practised by the Ger. occupation authorities. Politically many R. M. became associated with the left. See BELGIUM, History; GUERRILLAS; EUROPE, History; FRANCE, History; GREECE, History; MIHAILOVICH; Tito; YUGOSLAVIA, History.

Resistencia, tn. of Argentina, cap. of Chaco prov., on the Paraná R., opposite Corrientes. Its port, Barranqueras, is 4 m. distant. It is linked by rail with Santa Fé. There are large European settlements of colonists, who are chiefly engaged in cotton growing, and the processing of quebracho and other forest products, and in stock-raising. R. is a modern cultural and commercial centre and has an airport. Pop. about 52,000.

Resistor (electrical), a wire, bar, or coil of known const. resistance (q.v.).

Resolution: 1. Formal decision of a legislative or corporate body; or of a meeting or any association of individuals; or a formal proposition brought before a public body or meeting for discussion and adoption. In the House of Commons taxes and duties are introduced as 'resolutions' before being included in the Finance Act; and money bills are debated in the form of R.s. before coming on for second reading (see PARLIAMENT, Bill). A 'special resolution', confirmed by the court, is the statutory preliminary to the extension of the powers of a company.

2. Term used in harmony for the process by which a discord is made to pass into a concord.

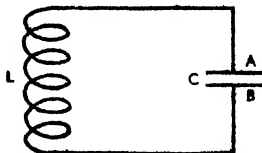
Resolution of Vectors, see COMPOSITION OF VECTORS.

Resonance, in physics, the setting up of vibrations in a system by an applied periodic force having a frequency equal to one of the natural frequencies of the

system. If there is little damping of the vibrations their amplitude may become very large even if the inertia of the system is great and the applied force small. This may be illustrated by the board of a child's swing. If the angle through which it swings is not too large each to-and-fro movement occupies nearly the same period of time; so the apparatus has its own natural frequency of vibrations; that is to say, if left to itself it will always make the same number of to-and-fro movements per min. By applying a series of gentle taps to the swing at regular intervals it can be put into forced vibration, and made to swing in time with the applied pushes. Suppose, for example, that its natural frequency is $\frac{1}{2}$ per sec., so that each to-and-fro movement requires 2 sec. If the taps are applied at intervals of $\frac{1}{2}$ sec. (say) the first few blows will drive it somewhat to one side, and it will then rebound from each successive one, moving with a frequency of 3 per sec. In general, unless the taps are heavy, the forced vibration will be only of small amplitude, or angle of swing; but if the frequency of tapping is reduced until it is approximately equal to the natural frequency each blow will fall at such a time that it reinforces the motion of the board. In consequence, even if the blows are light, a movement of considerable amplitude can be built up, and the swing, under these circumstances, is said to show R. This example is chosen by way of illustration because the reader can easily verify for himself what happens when the period is low; but in many cases that are of importance the frequencies are too high for direct observation without special aids. R. may occur as the result of the impact of sound waves, as it does when a key of a piano is held down to release the damper on one of the wires and the same note is sounded or sung in the vicinity; after the sound from the source has died away the piano wire can be heard emitting the note. By using hollow vessels designed to respond to notes of particular frequencies, Helmholtz applied the principles of R. for the analysis of complex musical sounds. R., however, is frequently troublesome because of the engineering problems it presents. Bridges and other structures, for example, may be endangered if they are subjected to periodic forces of frequency close to the natural frequency of some part of their structure. Such forces may result from vibrations due to traffic, from the regular step of soldiers marching (hence the order to break step in crossing a bridge), or from gusts of wind. To avoid R., engineering structures must be designed in such a way that their natural frequencies are far removed from those of any forces that are likely to be applied to them, and so that any vibrations set up are quickly damped out.

A phenomenon that is very similar to mechanical R., and to which the name R. is also applied, occurs in some types of electrical circuits (see RESONANCE, ELECTRIC). Suppose, for example, that a

circuit consists of an inductance L and a condenser of capacitance C, and that, at a certain instant, the plate A of the condenser is at a higher potential than B. Current will then begin to flow from A via L to B. Owing to the inductance, however, the current grows relatively slowly from its initial value of zero, and further, when the plates A and B have reached the same potential the current does not immediately drop to zero, but continues to flow for a time, raising the



RESONANCE IN AN ELECTRICAL CIRCUIT

potential of B above that of A. Therefore after the current has ceased momentarily, it begins to flow again in the reverse direction, and again raises the potential of A above that of B, after which the whole cycle of changes may occur again and again. Such a circuit has thus a natural frequency, whose value depends upon the magnitudes of the inductance and the capacity, and if a current is induced in it the current will oscillate with this natural frequency until its energy is used up in generating heat in the conducting wires of the circuit or in the radiation of electromagnetic waves. If a coil carrying an alternating current is placed close to L, an alternating current will be induced in the circuit, and, if the frequency of the current in the coil is close to the natural frequency, R. will occur, and the current in the circuit may become considerable. If the capacity of the condenser (C) is deliberately adjusted to give R., the circuit is said to be tuned to the frequency of the other current. Such tuned circuits find numerous applications in work involving high-frequency currents (e.g. in radio), and are used in most stages of radio and television receivers to select and respond to the required frequency. R. occurs not only in tuned circuits, where the inductance L and capacitance C are concentrated in a small space, but also in aërials (q.v.). A length of wire has both inductance and capacitance distributed along it, and thus resonates to a frequency determined by these factors. When suspended well clear of the ground this frequency is substantially related to the wire length (approximately half the wavelength), which resonates electrically in the same way as does a violin string mechanically.

Resonance, Electric, in oscillatory circuits (q.v.) occurs when in series connection the reactive voltages, in parallel circuits the reactive currents, are equal and opposite in phase and thus cancel out.

(For an elementary account see RESONANCE.) In a circuit with resistance R , inductance L , and capacitance C in series, the impedance at frequency $f = \frac{\omega}{2\pi}$ is

$$R + j\left(\omega L - \frac{1}{\omega C}\right) \text{ and the reactance}$$

vanishes at $\omega = \frac{1}{\sqrt{LC}}$. Assuming

$R < 2\sqrt{L/C}$ (otherwise oscillations do not occur), the Q -factor (q.v.) at resonance being $\frac{\omega L}{R} = \frac{1}{R\sqrt{LC}}$, the total voltage $E \sin \omega t$, the current, limited by R only, is a maximum and in phase with the voltage; the peak value is E/R . The voltage across the inductance has the peak value $\omega LE/R = QE$, equal but opposite in phase to the capacitor voltage, but greater than the total voltage in the ratio Q . If current values are plotted for varying frequency the curve shows a sharp rise at R ; the smaller the resistance, the sharper the rise. The series circuit discriminates in favour of currents of R frequency. If currents of different frequencies are superposed (harmonics, modulation, q.v.) the current of R frequency is limited by R only, currents of other frequencies are 'barred' by the full impedance. If the capacitor is adjustable the circuit can be 'tuned' to R at different frequencies. In a parallel connection of an inductance-resistance branch, L, R , with a capacitor C , the first has impedance $R + j\omega L$, admittance (q.v.)

$$\frac{R}{R^2 + \omega^2 L^2} - j\frac{\omega L}{R^2 + \omega^2 L^2},$$

the capacitor has admittance $j\omega C$. The reactive currents cancel out when

$$\omega C = \frac{\omega L}{R^2 + \omega^2 L^2},$$

that is, at

$$\omega = \sqrt{\frac{1}{LC} - \frac{R^2}{L^2}} = \frac{1}{\sqrt{LC}} \sqrt{1 - \frac{R^2}{L^2}}.$$

Then $R^2 + \omega^2 L^2 = L/C$ and the total admittance of the 2 branches in parallel is $\frac{R}{L/C}$. The total current is then a minimum, smaller the smaller the resistance. The parallel circuit thus acts as an effective bar to currents at R frequency. For very high frequencies, transmission lines, two parallel wires of certain length, or two co-axial conductors, are used as resonant circuits. Such lines, like power transmission lines, have inductance and capacitance distributed along the length, the resistance is negligible, the Q -factor is high. The length of the line is adjusted to $\frac{1}{4}$ of the wavelength corresponding to the desired R frequency. This gives a current distribution with maximum at the middle and zero at the ends. For ultra-high frequencies the cavity resonator (q.v.) is used.

Resorcin, or **Resorcinol** (*meta-di-hydroxybenzene*), $C_6H_4(OH)_2$, obtained by fusing benzene-meta-di-sulphonic acid with

potash. It is a colourless solid, crystallising in needles which melt at $119^\circ C$. It dissolves readily in water, alcohol, and ether. When heated with phthalic anhydride and the product dissolved in caustic soda a solution is obtained which exhibits a green fluorescence when diluted. R . is used in preparing fluorescein, eosin, and various azo-dyes; it is used for preparing ointments for chronic skin diseases, and, fused with an equal quantity of iodoform, as a dusting-powder employed in surgery. It has also been used as a constituent of hair-restorers, and as a cure for 'blackheads.' R . stains may be removed with citric acid.

Respighi, Ottorino (1879-1936), It. composer, b. Bologna. He studied composition and orchestration with Rimsky-Korsakov at St Petersburg in 1901. In 1902 he took an additional composition course with Bruch in Berlin. His first opera, *Re Enzo*, was produced in 1905. In 1913 he was appointed prof. of composition at the Accademia di Santa Cecilia in Rome. In 1919 he married his pupil Elsa Olivieri-Sangiuliano, a composer and singer, and from about that time he began to take a keen interest in old It. music and the church modes. He was appointed principal of the Accademia in 1923, but resigned in 1925, though retaining the composition professorship. His operas include *Belfagor* and *La fiamma*. He arranged music by Rossini for Diaghilev's ballet *La Boutique fantasque* and made his name especially by his suites of symphonic poems, *Fontane di Roma*, *Pini di Roma*, *Vetrate di chiesa*, and *Tritico botticelliano*, and orchestral arrangements of old airs and dances for the lute. He also excelled in chamber music and songs.

Respiration, act of breathing with the lungs; more generally, the interchange of gases within and without the living organism, oxygen being absorbed into the body and some of the products of combustion, viz. carbonic acid and water, being removed. In unicellular organisms oxygen is absorbed over the general surface, but in the more complex animal types special respiratory organs are present. In man the air enters the nose or mouth, passes to the pharynx (q.v.), and, the epiglottis being open, through the larynx (q.v.) into the trachea or windpipe (q.v.). The air, now being warmed to some extent, divides right and left into the bronchi (q.v.), then into the secondary and tertiary bronchi and into the bronchioles, or small divs. of the bronchi. At the end of the smallest bronchi sacs called alveoli occur. Each of these sacs is lined with epithelium, and between the epithelium and the elastic wall of the sac is a network of small blood-vessels. Across the epithelial layer of the air-sac and the endothelial layer of the capillary wall the interchange of gases takes place between air and blood. The collection of alveoli at the end of each bronchus is called a lobule, and the lobules, with the connective tissue in between, make up the lung. The

movement of breathing is initiated by involuntary stimuli, which cause the diaphragm to contract and other muscles to raise the ribs. The space occupied by the lungs is therefore enlarged, the elastic walls of the air-sacs expand, the contained air is rarefied, and a current is set up from the mouth and nostrils inward. When the inspiratory muscles have ceased contracting they return to their relaxed condition, the pulmonary cavity becomes decreased in size, and the results is an expiration of air. *See also under ARTIFICIAL RESPIRATION.*

Respirators, appliances for purifying or warming inhaled air, inhaling medicated vapours, or supplying air when deficient. For industrial use the prevalence of dust or steel particles is countered by the use of a mask in which the air is filtered through a fine gauze, magnetised if necessary. In smoke-laden or gas-filled atmospheres an oxygen apparatus (q.v.) is used. When the respiratory muscles are inactive, for example, through infantile paralysis, use is made of the Drinker R., or 'iron lung' (*see AEROTHERAPEUTICS*). Oxygen is supplied from a cylinder to the crews of high-altitude aircraft. The development of chemical warfare (q.v.) in the First World War led to the introduction of military R., and 'gas masks' were supplied to the civilian pop., as well as to the armed forces. In the Second World War. In all types filters were devised containing materials to absorb the gases, and with the introduction of new gases new filters were required. The civilian R. was basically the same as the military R., except that in the former the filter was part of the mask, whereas in the latter it was a separate component linked by a flexible tube.

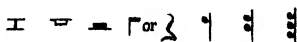
Respite: 1. In civil law, postponement by creditors of their claims in consideration of the debtor's proposals for a compromise.

2. Suspension of the execution of a criminal sentence (synonymous with reprieve, q.v.).

Respondentia, loan raised by the master of a ship upon the security of the cargo; the mortgage on the ship itself is known as *Bottomry* (q.v.).

Responsibility. It is the general rule in criminal law that every man must be presumed to be responsible for his acts until the contrary is clearly shown. (As to the exemptions, either total or partial, from criminal R., *see CRIMINAL LAW*.) In civil actions for tort, or, in Scots law, delict (i.e. actionable wrongs, such as negligence, assault, libel), the general rule as to R. is rendered simpler by reason of the principle that tortious or delictual liability is absolute, and only in a few exceptional cases can be said to import any particular state of mind; hence coverture, insanity, infancy, etc., are not grounds for exempting a person from liability to pay damages. As to a husband's liability for his wife's wrongs, *see HUSBAND AND WIFE*. As to liability in contract, *see CONTRACT*. *See also EVIDENCE.*

Rest: 1. In music, interval of silence between notes; the signs of rest-duration are:



Corresponding signs of note-duration:



2. Term used by the Bank of England and other banks for reserves.

Rest Harrow, perennial shrub, *Ononis procurrens*, of the leguminous family. Of creeping growth or, sometimes, more erect, the taller is spiky, the lower covered with viscid hairs. The toughness of the rootstock is so great that it is said to arrest the harrow when clearing the ground—whence the popular name.

Rest Mass, *see RELATIVITY*.

Restaurant, generally, a place where meals are served for consumption on the premises; in particular, a place where one may have food and wine of the finest quality in elegant surroundings. In its wider sense the R. business would include cafés, tea-shops, refreshment rooms, and some but not all canteens. Snack-bars, milk-bars, buffets, and similar premises might not come within this description, as R.s are generally understood to be places at which meals are normally served at tables by waiting staff. Some tea-shops, canteens, and cafeterias would also be excluded for the reason that they depend largely on self-service.

The word 'restaurant' appears to have had its origin in France some 200 years ago, when it denoted a house at which a particular kind of soup could be obtained. This soup was known for its restorative properties, and early R.s were concerned not so much with normal catering as with the special foods required by invalids. When the Fr. Revolution ruined many of the noble families their former chefs started similar businesses, extending the range of dishes so as to attract a wider but essentially high-class clientèle. Many made their names by serving some '*specialité de la maison*', creating an individual atmosphere which brought them an exclusive following. It is in the tradition of these artist-chefs that the R. properly so-called continues to-day in the prin. cities of the world.

In early Victorian times the tavern (q.v.) was the social centre, a local meeting-place for people with common interests who required good food and wine; many taverns were owned by vintners. Some became famous for their food, and are better known to-day as R.s. For the more modest purse there were alehouses, victualling and refreshment houses.

Particularly associated with business quarters, notably in the City of London, were the coffee houses (q.v.), the history of some going back another two or three hundred years. Stock jobbers would

meet at Jonathan's for lunch, and do business there before the Stock Exchange itself was estab. Underwriters used Lloyd's coffee-house, hence the name of their organisation and headquarters. Some of these houses became better known as chop houses. Stone's chop house, for example, had a long-standing reputation before it was destroyed in the Second World War. Dolly's chop house made its name for beef steaks, which were enjoyed by prominent literary men, and it created something of a sensation by employing serving maids instead of men.

Towards the end of the 19th cent. it was fashionable to dine at some well-known hotel (q.v.), or to take supper after the theatre in one of the best R.s. For the more formal occasion, evening-dress has been the rule. Less formality obtained in hotel grill rooms, one of the first being at the Savoy. Considerable expansion in hotel and R. business followed. In Soho, for instance, It., Fr., Swiss, and Hungarian chefs and waiters opened colourful and lively R.s, with characteristic individuality, and contributed much to the gay nineties and later years.

R.s, by whatever name they are called, have changed over the years to meet public needs. From dining out on a special occasion to the factory canteen, the range is considerable. The first R. in a department store was at Whiteleys in 1873; 10 years later the Aerated Bread Company started the tea-shop, to be followed and surpassed by Lyons in 1894. The vogue for morning coffee created the café, which, like the tea-shop, was mainly concerned with the sale of light refreshments. A modern development of the café is the coffee bar, where the speciality is coffee made by a process involving steam injection.

Canteens for employees in factories, offices, and shops form a specialised branch of the R. trade. During the last war employers of 250 or more were obliged to provide canteens on their premises, but even without this compulsion many large businesses, as well as a number of smaller ones, had introduced facilities of this kind. In some instances, the employers operate the canteen themselves, employing a catering manager; in others they lease the canteen to a firm of catering contractors. One of the objects of the canteens is to enable staff to obtain meals on the premises at low prices, and this usually means that the employer has to subsidise them.

R.s were particularly affected by food rationing, which in Great Britain continued from 1939 to 1953. The rationing scheme was administered by the Ministry of Food (as it then was), and caterers were allowed rationed foods on the basis of actual consumption in a datum period, the quantities being varied from time to time in proportion to the domestic ration. The maximum price for a meal in a R. was, for a long time, fixed at 5s., but hotels and R.s with specially heavy overheads could add a 'house charge,' and after 1945 further additions were per-

mitted where music, dancing, and cabaret were provided. Although guests staying 5 nights or more at hotels had to surrender ration documents, no coupons were necessary for meals in R.s. Canteens for manual workers could draw extra supplies where specially heavy work was being carried on. During the Second World War Brit. local authorities were permitted to operate 'civic restaurants' to augment the services provided by private caterers, and the Civic Restaurants Act, 1947, allowed them to continue to do so, subject to certain safeguards. After rationing ended, most of these civic R.s were closed.

From the legal point of view, a R. is a shop, and the proprietor is in the same position as any other shop-keeper in being at liberty to refuse to supply any customer if he wishes. R.s are, however, exempted from the closing provisions of the Shops Act, 1950, and may supply meals for consumption on the premises at any time. Refreshment houses which are open between 10 p.m. and 5 a.m. need a licence from the co. or co. bor. council. R.s may or may not be licensed for the sale of alcoholic drinks. Where a liquor licence is held, it is likely that a condition is attached to it limiting the sale of drinks to customers taking a meal, and possibly forbidding a bar. A licence of this kind is sometimes popularly known as a 'table licence.' In Scotland a R. has the same kind of certificate as a public-house, and so may not supply liquor on a Sunday. In Wales, too, the licence would apply only to weekdays, as there are no permitted hours there for licensed premises on a Sunday. The staff in R.s come within the scope of regulations made by the Minister of Labour under the Catering Wages Act, which vary according to the branch of the industry in which they are employed.

Restif (Rétif) de la Bretonne, Nicolas Edmé (1734-1806), Fr. novelist, b. Sacy, near Auxerre. His books are for the most part carelessly written and licentious in tone, but he was undoubtedly the literary forerunner of Balzac in his treatment of the petty bourgeois. He wrote some 250 novels, describing the low life in the 18th cent., the best known being the *Paysan perversi* (4 vols.), 1776, showing the bad influence of town life on the harmless countryman. See A. Bégue, *Restif de la Bretonne*, 1948.

Restigouche, riv. of NW. New Brunswick, Canada, forming the boundary between Quebec and New Brunswick for 50 m. It rises in Victoria co., and flows 200 m. to Chaleurs Bay in the Gulf of St. Lawrence. It is one of the most noted fly-fishing salmon rivers in the world. On it stand Dalhousie, the cap. of Restigouche co., where the International Paper Co. has a large pulp and paper mill, and Campbelltown with important lumber and fishing trades. Its name is Indian for 'riv. in the shape of a hand,' since the riv. has 5 arms.

Restitution of Conjugal Rights. A husband or wife who without sufficient reason

deprives the other spouse of his or her society, or neglects to perform his or her matrimonial obligations, may be sued for R. of C. R., and the court will grant a decree accordingly. In practice, the decree is usually no more than a step in the direction of divorce, because if, as generally happens, the respondent refuses to obey the order, his or her disobedience is tantamount to desertion, and a petition for judicial separation may at once be presented, or, if the offending party has been guilty of adultery, the other may

were restored, the word R. does not really adequately describe the situation which existed in England after 1660. For it was not in fact a complete R. The events and ideas of the interregnum had ensured that the spirit of the age of Charles I, its manners, social groupings, and constitutional alignments, could never be restored in full. Gardiner's sentence gives the key to the constitutional position after 1660: 'It was a restoration of parliament rather than of the king.' Though episcopacy was restored, and Anglicanism retained



Canadian National Railways

RESTIGOUCHE RIVER, NEW BRUNSWICK

immediately sue for a dissolution. See HUSBAND AND WIFE; JUDICIAL SEPARATION; MARRIAGE; DIVORCE.

Restoration, in England and Scotland, re-estab. of the monarchy in the person of Charles II, 29 May 1660. In France the term is sometimes used to describe the reinstatement of the Bourbons in 1814.

Most historians consider that Cromwell's death in 1658 made the Eng. R. inevitable. Only the strength of his personality could hold together the widely divergent forces that had made the revolution, the 'godly' and the 'parliamentarians.' But it was the skilful handling of personalities and events by Monck (q.v.) and Hyde, later Lord Clarendon (q.v.), which brought about such a peaceful, speedy, and apparently complete R. Nevertheless, though the Stuarts

its official monopoly, Dissent was too well estab. to be eradicated. A large class of Royalists had been forced to sell most of their land in order to survive, with a fraction of their property, the burdens of sequestration, forcible composition, and the decimation tax; others had sold early in the war, to help Royalist funds. For these people, whose selling had been legally voluntary, the expected redress never came. After 1660 many names among the squirearchy were those of men who had skilfully changed sides in time to safeguard their accumulations, or speculators in army debentures who had been able to buy up Royalists with their fortunes in the days of the Commonwealth, when land had been exceedingly cheap. The part played by the City of London in the R. has yet to be fully examined, but it seems clear that its attitude was

of vital importance. After the R. the moral and financial power of the city is a visible major factor in political life. The literature of the R. period, especially that of the theatre, shows a reaction against the austerity of the interregnum, when theatres had been closed. R. literature owes much of its form, its cynicism, and its extravagances of situation to Fr. influence, a direct consequence of the Stuart exile. The works of Dryden, Congreve, Wycherley, and Vanbrugh possess variously a charm, skill, beauty, and zest which has made them literary masterpieces; but they are very different from the simple, fresh, less-sophisticated lyricism of Herbert, Lovelace, and Herrick. The reaction against Puritanism showed itself also in a licence which appeared not only in some of the literature, but outstandingly in society manners, such as had never been permitted at the court of Charles I.

In a number of ways an advance on the early Caroline epoch, the R. certainly differed from it considerably, and, as such, was bound to be a bitter disappointment to many. Clarendon's hist. gives a vivid picture of Royalist disillusionment at court. A comparison of the debates in the House of Commons during the reigns of the 2 Charleses, if it shows, after 1660, the beginnings of the modern party system, shows there also a distinct deterioration in moral principle since the days of Pym, Hampden, and Elliot. Politics had become a field for the ambitious money-maker. The *Verney Memoirs*, which cover both reigns, demonstrate the change in attitude of a co. family over the period. An imaginary reconstruction of the disillusionment and decay of the small Royalist squirearchy is given in the novel *None so Pretty*, by Margaret Irwin, 1930. See also CHARLES II; CLARENDON, EDWARD HYDE; ENGLISH HISTORY; MONCK, GEORGE; ROYALISTS; WAR, CIVIL. See Samuel Pepys's *Diary*; Evelyn's *Diary*; *The Commons Journals*; *Clarendon State Papers*, vol. iii; *Verney Memoirs*; Clarendon, *History of the Rebellion and Civil Wars in England*, 1641-60, 1707; G. Burnet, *History of his Own Times*, 1724, 1900 (ed. O. Airy); M. Guizot, *Histoire de la révolution d'Angleterre*, 1826-7, 1843, 1850; D. Masson, *Life of Milton*, 1859-80, 1881-96; S. R. Gardiner, *History of England*, 1863-82, 1883-4, 1885-1900; A. Bryant, *King Charles II*, 1931; and D. Ogg, *England in the Reign of Charles II*, 1934.

Restoration, in architecture; the repairing and rebuilding of portions of historical buildings in imitation of the parts surviving, with the object of making the new harmonise with the old. The lack of sympathy with medieval architecture which prevailed during the 17th-18th cents. gave place in the early 19th cent. to a movement for wholesale R., encouraged by the Ecclesiol Society. The earlier R.s of cath. by James Wyatt (q.v.) were attacked by A. W. N. Pugh. Later in the 19th cent. the chief

were, in France, Viollet-le-Duc (q.v.) and, in England, Sir George Gilbert Scott (q.v.), whose chief critic was William Morris (q.v.). Modern opinion prefers judicious conservation rather than sweeping R. See PROTECTION OF ANCIENT BUILDINGS and PROTECTION OF ANCIENT MONUMENTS; also M. S. Briggs, *Goths and Vandals*, 1952.

Restoration (of paintings), name given to various highly skilled processes applied to old paintings that have been lost or neglected for many years. Such paintings are invariably covered with varnish to protect the paint; often the only R. needed is the cleaning of this varnish, which turns yellow or brown with age and collects dust which would otherwise ruin the actual pigments. Microscopic examination of the varnish reveals a pattern in the cracks which identifies its consistency and the correct solvent to remove it. This solvent is usually 25 per cent turpentine, 5 per cent alcohol. X-rays and the polarised microscope are then used to distinguish the ages of different pigments and media, and it is in this stage that many hidden masterpieces have been discovered; the old painting may have been substantially altered or even covered with a different picture. Holbein's portrait of Sir Wm Butts was altered to show Sir Wm as an old man. Recently the tintometer has been used in restoring paintings. By reflecting light from small areas of the picture and from magnesium carbonate ('standard white') the colours of the painting may be matched and measured, to tell exactly how much the R. has altered them.

The catalogue 'Cleaned Pictures' issued by the National Gallery, 1947, explains and defends the much-criticised cleaning of works by Rubens, Velazquez, and others.

Restraint of Marriage. Contracts and conditions in R. of M. in wills or settlements *inter vivos* are void and against public policy. But where the restraint is only partial, it may be valid, e.g. the testator or suitor cannot validly provide that A shall forfeit all benefit under the will or settlement if she marry; but he may well deprive her of all benefits if she marry a particular person or class of person. A husband, however, is perfectly entitled to direct that his widow's interest in his property shall go over to someone else as soon as she marries again. See MARRIAGE.

Restraint of Trade. The general rule of law is that agreements in R. of T. are void. It was this general principle of the law of contract, aided by the vaguer law of conspiracy (q.v.), that operated for some time against the development of trade unions (see INDUSTRIAL RELATIONS). At the present day no clause will be set aside by the court as being in R. of T. unless obviously unreasonable. The construction of such clauses very frequently arises in cases where an assistant in a profession or apprentice to a trade, being desirous of setting up either in opposition to or in the same neighbourhood or part of the country as his former partner or master,

finds himself restricted by an agreement not to encroach. If the radius of prohibition be unreasonable, the court will not issue an injunction against him for encroachment, and will often invite the plaintiff to submit to more reasonable terms.

Restraint upon Anticipation. In Eng. law, before 1882, all the property of a wife belonged to her husband. In order to protect it from the improvidence and greed of her husband, a wife's property was often vested in trustees for the 'separate use' of the wife. By a device known as a 'restraint upon anticipation' clause, a wife was prevented from realising the capital or charging the future income of her 'separate estate.' By the Law Reform (Married Women and Joint Tortfeasors) Act, 1935, no such clauses can be inserted in trusts created since 1 Jan. 1936. Since the Married Women (Restraint upon Anticipation) Act, 1949, married women have been freed from R. upon A. clauses imposed on settlements created before 1936, thus placing them in exactly the same position as spinsters and widows.

Resultant Tones, see COMBINATION TONES.

Resurrection, rising again of the body and its reunion with the soul. In its widest sense a belief in it is not peculiar to Christianity; anticipations of it are found in Zoroastrianism and later Judaism. Among the Jews it was stimulated by the persecution of Antiochus Epiphanes (see Dan. xii. 2; 2 Macc. vii. 9) and developed by the later Apocalypticists. The Sadducees, unlike the Pharisees, rejected it (Matt. xxii. 23 ff., and cf. John xi. 24), and of this controversy St Paul took advantage when brought before the Sanhedrin. Christian belief in the R. is founded on the rising of Jesus and His subsequent appearances to the disciples. The preaching of the R. seems, indeed, to have formed a large part of the apostolic mission. The fullest N.T. expositions of the belief occur in 1 Cor. xv and 1 Thess. iv, where the Apostle explains the spiritual nature of the risen body. The Christian doctrine of general R. is a revealed truth; it cannot be proved from reason alone, but its probability is seen in the fact that man's complete personality involves the life of both soul and body. See W. J. Sparrow Simpson, *The Resurrection and Modern Thought*, 1911; F. E. Marsh, *The Resurrection of Christ*, 1923; H. Wace, *The Story of the Resurrection*, 1923; Burney, *Israel's Hope of Immortality*; F. Morison, *Who Moved the Stone?*, 1932; A. Lunn, *The Third Day*, 1945; E. F. Sutcliffe, *The Old Testament and the Future Life*, 1947.

Resurrection Plant, name given to *Selaginella lepidophylla*, a Club-moss native to Texas and S. America, curling up tight when dry, unrolling and resuming fresh appearance when placed in water. It is a greenhouse plant. *Anastatica hieracuntica*, the Rose of Jericho, is sometimes called a R. P.

Resurrectionists, or Resurrection-men, familiar name given to gangs who, especially in the early part of the 19th cent., gained a livelihood by opening graves and selling recently-buried bodies to the teachers of anatomy. The time chosen for the process of resurrection was in the early evening in winter, before the night watch had been set in the churchyard. A hole was dug down to the head end of the coffin (with a wooden implement, to avoid the noise of metal striking stone) and the loose earth was placed on a canvas sheet to prevent scattering. When the coffin was reached 2 iron hooks were placed under the lid to break off sufficient to extract the body. Grave clothes were put back in order to avoid the charge of theft. The surface of the ground was carefully restored, and the body placed in a sack and transferred over the graveyard wall. The whole process took less than an hour. As the demand grew there arose professional gangs of 'body-snatchers.' The case of Burke and Hare in Edinburgh (see BURKE, WILLIAM) showed that the flourishing nature of the trade, coupled with the lack of legislative control of the practice, was a temptation to murder. A Select Committee of Anatomy was appointed in 1828, and in 1832 the Anatomy Act was passed, regulating the supply of bodies for dissection, although for some years afterwards the practice of the R. continued, though covertly. See J. M. Ball, *The Sack 'em up Men*, 1928; James Bridie, *The Anatomist*, 1931.

Resuscitation, the revival of one apparently dead. The methods used in R. must depend largely on the cause, and the untrained onlooker may often serve best by not being too active. The first essentials in treating an unconscious, apparently moribund patient are to see that the air passages are clear and to maintain warmth in the body. Blankets should be put under as well as on top of the patient and hot-water bottles placed at the feet and between the legs, but care must be taken not to cause burns. Clothing at the neck and waist should be loosened. The head should be kept low and turned to one side so that any accumulated mucous or vomitus can run out of the mouth. The tongue should be pulled forwards, and if it inclines to fall back it should be held between finger and thumb over a folded handkerchief. False teeth and foreign bodies should be removed and the mouth and throat cleared of mucous and debris. What else is done must depend on the nature of the case. If the patient has been severely injured it is wise to do no more, since activity may well aggravate the injuries already sustained. But in cases of drowning, electric shock, and poisoning in which respirations have ceased, artificial respiration must be started without delay and maintained unceasingly, if necessary, for at least 2 hrs, or more if any signs of life are present. Cases have been known of recovery after 3 or even 4 hrs of apparent lifelessness. From published figures artificial respiration

is successful in 67 per cent of cases of electric shock within 30 min., and in a further 8 per cent of cases between 30 and 60 min., though had there been more persistence greater success might have been attained. In cases of asphyxia from poisonous gases, such as coal gas, it is important that as much fresh air as possible should surround the patient. Windows should be opened widely or the patient removed from the poisoned atmosphere. Oxygen and carbon dioxide gases, when available, should be given to the asphyxiated patient. The R. of the new-born baby is a matter for skilled attention. If this is not available the baby should be wrapped in blankets and placed in a cot with the head slightly lower than the feet. The mouth should be gently cleared of mucus by wiping with a piece of gauze folded over the little finger. If these measures are not successful respiration may sometimes be started by placing the mouth against the baby's mouth and breathing into it gently. Alternatively, the cot or cradle may be rocked to and fro in a see-saw movement some 10 times a min., each tilt extending to 45° from the horizontal. This is an adaptation of Eve's rocking method of artificial respiration. *See also under ARTIFICIAL RESPIRATION; DROWNING; and AEROTHERAPEUTICS. See Royal Life-Saving Society, Handbook of Instruction; and St John's Ambulance Association, First Aid to the Injured.*

Retail Prices, *see* STANDARD OF LIVING: COST OF LIVING.

Retainer. The object of a R. is to secure the services of a particular barrister and to bind him not to appear on behalf of the opponent of the litigant who proffers the R. The whole practice or 'etiquette' as to R.s is settled by the Bar Committee in conjunction with the Law Society (q.v.), and the courts have no jurisdiction to decide questions relative to R.s. A *general R.* is the fee paid for retaining counsel before an action has commenced; a *special R.* is one given after commencement, and is usually lower than a *general R.*

Retention, Scots equivalent for the right of lien (q.v.). A *special R.* of a thing may be exercised for repairs to it, by a carrier for the expenses of carriage, by a salvor for salvage charges, by an unpaid vendor for the price, or in any similar case. The right of *general R.* in respect of *any* debt which may happen to be due, or against the discharge of a general balance of account arising out of a course of employment, is given either by trade custom, express contract, or tacit acceptance of advertised conditions. Law agents, factors, bankers, and policy-brokers, among others, enjoy the right of general R.

Retford, East, municipal bor. and mrkt tn of Notts., England, on the Idle, 20 m. NNW. of Newark; it has corn- and paper-mills, dyeworks, iron foundries, engineering and India-rubber works. The tn has also a large agric. trade. E. R. became a bor. in the Middle Ages, and was famous for its mrkts and fairs. The

grammar school was founded in 1552. Pop. 16,780.

Rethel, Alfred (1816-59), Ger. painter and engraver, b. Diepenbend, near Aachen. He began his training at Düsseldorf under Schadow, and achieved fame with his striking frescoes of episodes in the life of Charlemagne for the Aachen City Hall (1844-52). Among his other works are 'Nemesis,' 1837, and 6 water-colours depicting the 'Expedition of Hannibal Crossing the Alps,' 1844-5. His illustrations to Reinick's poetical text *The Dance of Death*, 1848, influenced the British illustrators of the 1860's. *See* lives by Müller von Königswinter, 1861, and R. Franck, 1937.

Reticle, *see* TRANSIT INSTRUMENT.

Reticulated Tracery (Lat. *reticulum*, a small net), stone tracery of the mid-Gothic period, with openings repeated in rows, thus resembling the meshes of a net (*see* TRACERY).

Retief, Piet (1780-1838), organiser with Gerrit Maritz of one of the Voortrekker expeditions from Cape Colony into the country N. of the Orange R. He was elected a leader of the Voortrekkers, 1837. R. was treacherously murdered whilst unarmed, together with his party of 60, by the Zulu chief Dingaan, Feb. 1838 (*see* DINGAAN'S DAY).

Retina, *see* EYE.

Retinoscopy, *see* VISION, DEFECTS OF.

Retirement Pensions. Negotiations for a pensions scheme began in 1893 with the appointment of a Royal Commission on the Aged Poor. Parl. committees in 1899, 1900, and 1903 considered the proposals advanced by the Commission (3 alternative possibilities for the provision of pensions, viz. by imperial taxation, by compulsory insurance, or by state-aided voluntary insurance), but no definite agreement was reached. An experimental system was set out in the Old Age Pensions Act of 1908, by which time pension schemes already existed in New Zealand, Victoria, New S. Wales, Denmark, and Germany. Pensions were restricted to persons over 70 who had been Brit. subjects for the previous 20 years, and whose yearly means did not exceed £31 10s. Certain classes of people were disqualified by a number of other subsidiary conditions. The maximum rate was 5s. a week, afterwards increased to 10s. a week, when yearly means did not exceed £21; the minimum, 1s. a week for means between £23 17s. 6d. and £31 10s. The principle of contributory pensions had been considered and rejected on the grounds that it would exclude most women as well as men with small incomes; but subsequent demands for the lowering of the pensionable age, and the rising cost of pensions, led to the Widows', Orphans', and Old Age Contributory Pensions Act of 1925. By this, persons who were insured under the National Health Insurance Scheme, whether as employed or as voluntary contributors, were entitled to 10s. a week from the age of 65 onwards. In its present form, the R. P. system dates from the National Insurance Act of 1946,

under which it was thoroughly revised. For full details of rates of contributions, etc., see NATIONAL INSURANCE ACT (1946); SUPERANNUATION; also CIVIL SERVICE.

For R. P. in the commonwealth, see *Year Book of the Commonwealth of Australia*, *New Zealand Official Year Book*, *Canada Year Book*, *Official Year Book of the Union of South Africa*, etc. (ann.).

Retorsion, in international law, is an unfriendly but legal act by one state in retaliation for a similar act of another. Tariff discrimination is a form of R. employed by a state to counter trading restrictions. The so-called 'cold war' with Russia after the termination of the Second World War offers many instances of acts of R. See *EUROPE, History, The 'Cold War' between the Western Powers and Russia*.

Retort, in chem., vessel in whose chamber an object is subject to distillation (q.v.) or decomposition by heat, a neck conducting off the volatile products. The R. of the laboratory is made of glass, porcelain, or platinum, is flask-shaped, and has a long neck attached in which the products of distillation are condensed and from which they pass into the receiver. The R. of the gas-works is a cylinder made of iron or clay.

Retreat, military operation, either forced or strategic, by which troops retire before an enemy. It differs from a flight in being orderly and under control. Also the call blown by a bugle at sunset when the unit flags are lowered.

Retriever, valuable all-round sporting dog. Of the three varieties the Labrador (see also LABRADOR RETRIEVER), which had a common origin with the Newfoundland dog, is the oldest, though not recognised by the Kennel Club till 1903;



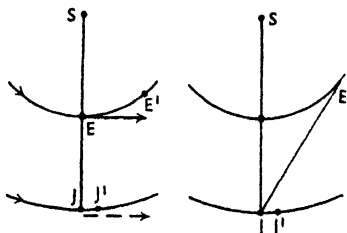
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FLAT-COATED RETRIEVER

it has since competed with great success at field trials. From it and the setter and the collie the flat- or wavy-coated R. was derived. This is a beautiful dog with wonderful 'nose' and great fondness for retrieving. The head is long and fine, the muzzle square, eyes dark, neck long, ears small and carried close to the head,

body short and square, stern short and straight, and coat dense black or liver. The golden R. probably derives from the flat-coated R., but is a rich golden colour. The curly-coated R. is traceable to poodle cross-breeding, from which it derives its excellence as a water dog. The coat should have a tight close-fitting curl, and the colour is usually dull black, though sometimes liver. There are also interbred and cross-bred varieties. The R. should have a 'tender mouth' and should be able to handle game without mangling it. The R. is a strong, well-made sporting dog of unusual intelligence, obedient, easily trained, affectionate, good-tempered, and hardy.

Retrograde Motion. The planets share with the stars an apparent motion westward, due to the rotation of the earth on its axis, but in addition each planet has its own orbital movement round the sun



RETROGRADE MOTION OF A PLANET DIRECT MOTION OF A PLANET

from W. to E. For this reason the planets change their positions amongst the stars, usually appearing farther eastward night by night. Sometimes a planet appears to remain for a few nights almost in the same position with reference to the stars and then seems to move westwards—a phenomenon which proved puzzling to the ancient astronomers. The explanation of this is very simple, and will be easily understood by referring to the diagram (*left*), which represents the planet Jupiter moving in its orbit round the sun and also the earth moving in its orbit. If E and J represent the positions of the earth and Jupiter when the latter is in opposition, that is, in a line with the sun and the earth, then when the earth has moved to E' Jupiter will have moved to J', the orbital motion of the earth being much faster than that of Jupiter, so that the arc EE' is larger than JJ'. An observer on the earth judges the motion of Jupiter by projecting the planet on the background of stars, and when the earth is at E' Jupiter will be seen in the direction of E'J'. When the earth is at E' Jupiter will appear projected on the background of the distant stars in the direction E'J', and an observer on the earth will describe its motion as retrograde, that is, in a direction opposite to that of the earth and the planets in general. In the diagram (*right*) E and J represent positions of the earth

and Jupiter, respectively, at some other time. The earth is now moving straight away from Jupiter for a short period, and Jupiter itself will have moved in the time to *J'*, so that an observer on the earth will see its motion as direct, because the line *EJ* rotated round *E* to *J'* is in the sense of 'direct' in the solar system. It is easy to make a number of diagrams to show when the apparent motion will be direct and when retrograde. The case of a superior planet only has been considered, but the explanation is similar for an inferior planet such as Venus or Mercury.

Returning Officer, see ELECTIONS.

Retz, Jean François Paul de Gondi (1614-78), Fr. cardinal, *b.* Montmirail. After the death of Louis XIII he became coadjutor to his uncle, the Archbishop of Paris, and, aiming at political influence, incurred the hatred of Mazarin. He was involved in the outbreak of the Fronde, and was imprisoned for 2 years. He made his escape, and went abroad. In 1662 he returned to France, resigning his archbishopric and governing the Abbey of St Denis, where he lived the retired life of a philosopher and a religious. His *Memoirs* (first pub. 1717), covering the years 1643-55, are a vivid, if prejudiced, account of an important period of Fr. hist.

Retz, Rais, or Raiz, Gilles de Laval, Seigneur de (c. 1396-1440), Fr. baron and soldier. He became marshal of France and was famous as a follower of Joan of Arc and for his bravery in war, but was notorious for his diabolical cruelties, for which he was burnt alive at Nantes (1440). He is said to have murdered nearly 200 women and children. He is supposed to be the original 'Bluebeard.' *See* Abbé Bossard, *Gilles de Rais dit Barbe-Bleue*, 1886; F. Winwar, *The Saint and the Devil*, 1948.

Reuben, 'God hath looked upon my affliction' (Gen. xxix. 32): 1. Eldest son of Jacob and Leah. R. is represented as more merciful to Joseph than his brethren (Gen. xxxvii. 22, 29). He incurred his father's displeasure by adultery with his father's concubine (Gen. xxxv. 22), and so is cursed instead of blessed by his father in Gen. xlix. 3, 4. This poem as it stands is a reflection on later tribal history.

2. Tribe descended from 1. It settled in the territory of Sihon in Transjordan (c. 1200 BC), as excavation has confirmed, and was exposed to constant incursions from the Moabites. By the time of David the tribe had disappeared, and he conquered the territory afresh, only for it to be lost to Masha, King of Moab (q.v.).

Reublin, Wilhelm (c. 1480-1559), Anabaptist, *b.* Rothenburg am Neckar; missionary of Anabaptism to the Swiss. In 1531 he founded a community run on Communist principles. *See* E. Egli, *Die Zürcher Wiedertäufer*, 1878; L. Müller, *Der Kommunismus der mährischen Wiedertäufer*, 1927.

Reuchlin, Johann (1455-1522), Ger. humanist, *b.* Pforzheim, Baden, a cousin

of Melancthon (q.v.). He was appointed travelling companion to Frederick, son of the margrave, and accompanied him to the univ. of Paris. Here he studied Greek, and applied himself to Lat. composition and Hebrew. In 1474 he went to Basel, where he took his degree and began to lecture on the classics. In 1478 he returned to France and studied law at Orleans, later teaching this subject at Tübingen and Ingolstadt. In 1496 he moved to Heidelberg, where he trans. many Gk works, and about 1500 was made a judge of the Swabian League. In 1510 he came into conflict with Pfefferkorn, a Jewish renegade, for defending Jewish books (other than the Bible) which Pfefferkorn had urged the Emperor to have burned. The dispute, known as 'the Battle of the Books,' led to the publication of R.'s *Epistolae Obscurorum Virorum* (2 vols.), 1515-17. R. was also the author of two famous works on cabbalism, *De verbo mirifico*, 1494, and *De arte cabbalistica*, 1517; of *Rudimenta linguae hebraicae*, 1506, which founded the study of Hebrew in Germany; and of 2 Latin plays, *Sergius*, 1496, and *Heuno*, 1497, which are pioneer works in Ger. comedy. He died at Bad Liebenzell. *See* life by L. Geiger, 1871; also J. Haller, *Die Anfänge der Universität Tübingen*, 1927-9.

Réunion, Ile de la, formerly known as *Ile Bourbon*, is. of the Mascarene group, Indian Ocean, forming, till 1946, a Fr. colony. It is 420 m. E. of Madagascar. It is of volcanic origin, and is divided into 2 portions, E. and W., by a chain of mts and a tableland. The highest point, Piton des Neiges, reaches an altitude of 10,070 ft and is surrounded by extinct craters. The climate is temperate, cool in the higher regions but hot on the coast. R. is well watered by numerous torrential streams, the most important being Rivière de St Etienne, Rivière des Galets, and Rivière du Mét, and the soil is fertile. Hot mineral springs exist on the slopes, and sanatoria have been estab. at Cilaos, Salazie, and Heilbourg. The chief products are sugar, rum, manioc, vanilla, tapioca, starch, vetiver, and geranium (palmarosa) oil, etc. St Denis is the cap., and St Louis, St Pierre, St Benoit, and St Paul are other prin. tns. Pointe-des-Galets on the NW. coast is the prin. port; a coastal railway connects it with St Benoit and St Pierre. R. was discovered by Pedro de Mascarenhas in 1513. France annexed it in 1638; England held it from 1810 to 1815, and on its restoration to France it was renamed R. In 1946 the status of R. was changed to that of a dept. of France. It is administered by a *préfet* assisted by a privy council, and is represented in the National Assembly by 3 deputies, in the Council of the Republic by 2 senators, and in the Assembly of the Fr. Union by 1 delegate. It was controlled by Vichy in the early part of the Second World War, but Free Fr. troops landed on 29 Nov. 1942. Area 970 sq. m.; pop. 280,000 (Fr. 214,400).

Reus, Sp. tn in the prov. of Tarragona, near the Mediterranean coast. It is an important industrial tn, with textile mills and a trade in wine, fruits, and flour. Pop. 30,000.

Reusch, Franz Heinrich (1825-1900), Ger. Old Catholic theologian, b. in Westphalia. In 1858 he was appointed theological professor at Bonn. In 1871 he was excommunicated for his rejection of the Vatican decrees, and for 7 years held the post of Old Catholic curé of Bonn. He was made rector of the university there in 1873. R. was an erudite scholar and thinker, and wrote numerous works, amongst them *Liber Sapientiae: Bibel und Natur; Das biblische Schöpfungsgeschichte; Die Deutschen Bischöfe und der Aberglaube*; various works on the O.T.; essays on the history of the Jesuit order, etc.

Reuss, name of 2 former Ger. principalities, both of which were founded in 1617: one covered an area of 122 sq. m., cap. Greiz (q.v.); the other covered an area of 319 sq. m., cap. Gera (q.v.). After the First World War the 2 principalities became reps., and in 1919 became part of Thuringia (q.v.). The ter. is for the most part hilly, and the surface is largely forested. The inhab. are nearly all Evangelical Protestants.

Reuss, riv. of Switzerland, trib. of the Aar. It rises in the canton of Uri and flows in a general northerly direction over a course of about 30 m. into Lake Luzern. Issuing from the lake, it flows NW. and joins the Aar. Length, including Lake Luzern, 100 m.

Reuter, Christian (c. 1665-1712), Ger. satirist, b. at Kütten bei Halle. His satires on the *haute-bourgeoisie* of the late 17th cent. have something of the wit and penetration of Molière. His principal work is the novel, *Schelmusskys Reisebeschreibung*, 1696, a parody on the novel of adventure. He also wrote a successful comedy, *Die ehrliche Frau zu Plissinc*, 1695. See studies by O. Deneke, 1927; F. G. Schneider, 1936; H. König, 1947.

Reuter, Gabriele (1859-1941), Ger. novelist, b. Alexandria, educ. in Germany. Her most successful novel was *Aus guter Familie*, 1895, a penetrating study of the problems of the contemporary woman. Her later novels, such as *Ellen von der Weiden*, 1900, and *Liselotte von Reckling*, 1903, though artistic and skilfully planned, were less successful.

Reuter, Heinrich Ludwig Christian, known as Fritz (1810-74), Low Ger. poet and novelist, b. Stavenhagen, Mecklenburg, and studied law at the univs. of Rostock and Jena. At Jena he took part in a students' political club, with the result that he spent 5 years in prison for treason. Later he took up farming and then private teaching. In 1853 he pub. *Läuschen un' Kimmels*, a collection of humorous poems which became extremely popular. Next appeared the narrative poems *De Reis' na Belligen*, 1855, *Hanne Nüte un de lütte Pudel*, 1860; *Dörchtlüchting* and *Olle Kamellen*, 1866, his prin.

prose works; *Ut mine Stromtid*, his masterpiece; *Lustspiele und Pötlerebendgedichte*, etc. R.'s stories (written in 'plattdeutsch' or peasants' dialect) are marked by fresh humour and skilful character-drawing, though the plots are somewhat weak. They are drawn either from his own experiences or from historical reminiscences of Mecklenburg. See lives by A. Romer, 1895; A. Wilbrandt, 1902; and F. Griese, 1938.

Reuter, Paul Julius de, Baron (1816-99), Ger. telegraph promoter and the founder of Reuters Agency, b. Kassal and became a bank clerk at Göttingen. He formed an organisation at Aachen in 1849 for transmitting commercial news by pigeon post and then by telegraph, and in 1851 came to England and opened an office in London for the transmission of intelligence between England and the Continent. His enterprise rapidly grew in importance, and is now in operation over all parts of the world. His business was converted into a limited-liability company in 1865, and in 1871 he was created a baron.

Reuters, leading Brit. and international news agency, founded by Baron Julius Reuter (q.v.). It have a world-wide service covering all kinds of foreign news. After the First World War the business was converted from a public company into a private trusteeship, the shareholders being paid out for over £500,000. Later the concern became closely associated with the Press Association, which agency previously had transmitted Reuter messages to the newspapers of Great Britain. This arrangement thus involved the proprietorship of the famous agency passing to the newspapers of Great Britain, a policy dictated by national considerations. In 1947 the final steps were taken to convert it into a world news agency under the ownership and control of the newspapers of the U.K., Australia, and New Zealand. New articles of association were adopted by the Press Association's and the Newspaper Proprietors' Association's representatives, and the Australian Associated Press and the New Zealand Press Association have taken up new shares in R., while both these dominion agencies have become parties to the Reuter Trust. In 1949 the Press Trust of India took shares in the Reuter Trust. The independent chairman of the Reuter Trust is appointed by the lord chief justice. The trust deeds stipulated that it shall never pass under the control of one interest or group. See also PRESS ASSOCIATION.

Reuther, Walter Philip (1907-), Amer. labour leader, educ. at Wayne Univ. From 1927 to 1932 he worked for various motor firms, and from 1935 began to organise the workers in the motor industry into a union. He was vice-president of the Union of United Automobile, Aircraft, and Agricultural Implement Workers of America from 1942 to 1946, and has been its president since 1946. Since 1952 he has been president of the Congress of Industrial Organisations

and exercises considerable influence over Amer. labour as a whole.

Reutlingen, Ger. tn in the *Land of Baden-Württemberg* (q.v.), 19 m. S. of Stuttgart (q.v.). It is picturesquely situated on steep hill slopes, has old towers, walls, and houses, and has a very fine 15th-cent. Gothic church. There is a textile institute and a school of leather-tanning. The prin. industries are the manuf. of textiles, machinery, and leather, and the tn is a printing and publishing centre. Pop. 60,000.

Revel, Fr. tn in the dept of Haute-Garonne. It has a 14th-cent. fortress, an anct market, and manufs. of furniture and spirits. Pop. 5500.

Revel, or Reval, see TALLINN.

Revelation, in theology, denotes the unveiling of some truth by God to man. The term is used in a more restricted sense for the truths revealed in Scripture and in the traditions of the Church received from Christ and the Apostles. If the existence of a personal God be once granted the possibility of R. cannot be denied, though the fact and the nature of R. remain to be investigated. For the Modernist School (Loday, Tyrrell) the so-called truths of R. were but the expressions of the highest desires of man in his efforts to attain to a transcendent God, and so liable to change and reinterpretation. The Catholic doctrine of R. is that a 'deposit of faith,' i.e. a number of truths, has been revealed by God to man (especially in Christ) of permanent value for all time. For a truth to be revealed it is not required that it should be otherwise unattainable, but that it should in point of fact have been revealed. Thus the existence of God may be demonstrated from reason, but it appears in the Bible without such demonstration (Exod. iii. 14). Frequently, however, revealed truths are distinguished from natural religion, the content of which is demonstrable by the processes of reason.

Revelation, Book of, or The Apocalypse, the last book of the Bible. Its author names himself John, and writes to the 7 churches of Asia Minor. He is identified as John the Apostle by Justin Martyr (c. 140), and Polycarp, John's disciple, martyred at Smyrna in c. AD 155, quotes the work. By some it has been attributed, after Eusebius, to John the Presbyter, but the separate existence of this person has never been proved. We have the statement of Irenaeus for the vision having been seen not long since, 'almost in our own generation, at the close of the reign of Domitian' (AD 98), and he attributes it expressly to 'John the disciple of the Lord' (*Adv. Haer.* V. xxvi). The difference of style between the Fourth Gospel and the Apocalypse, however, constitutes a difficulty. This difference is accounted for by Radcliffe as a deliberate Apocalyptic mannerism. The meaning of the book has been a constant subject of dispute. It has repeatedly served as a foundation for millenarian views. The first part (chapters i-iii) consists of letters of encouragement or

warning to the bishops, or 'angels,' of the Asiatic churches. The body of the prophecy (chapters iv-xxii) undoubtedly deals with the end of the world, though there are allusions to contemporary events and to the Christian liturgy of the 1st cent. In reading the visions it is important to realise that they are not arranged in chronological order, but are like a series of separate flashes each describing the end of the world under a separate set of symbols. See also APOCALYPSE. See H. B. Swete, *The Apocalypse* (3rd ed.), 1911; J. Chapman, *John the Presbyter*, 1911; Lt. H. Charles, *The Apocalypse*, 1920; Aelo, *St Jean: L'Apocalypse*, 1921; A. M. Farrer, *The Glass of Vision*, 1948.

Revels, Master of the, name of an Eng. official formerly attached to royal and noble families. He was also known as the 'Lord of Misrule,' and his chief function was to preside over plays and performances of mountebanks, ballad singers, etc., and generally supervise and arrange the amusements of the court or great house as the case might be. The office fell into disuse early in the 18th cent. See FESTIVAL.

Revelstoke, tn in Brit. Columbia, Canada, on the Canadian Pacific Railway, 360 m. NE. of Vancouver. It is the centre of a mining and lumber dist. Pop. 3386.

Reventlow, Count Christian Ditlev (1748-1827), Dan. statesman and reformer. b. Copenhagen. He was an able administrator, and while in office reorganised Dan. agric. economy. In 1786 he initiated the appointment of the commission which abolished serfdom.

Reventlow, Count Ernst Christian Einar Ludwig Ditlev (1869-1943), Ger. politician. b. Husum, Schleswig-Holstein. at that time a part of Prussia. He was a writer on political subjects and on naval strategy, and in the decade before the First World War was a leading member of the 'Pan-Ger.' group of politicians. He became a member of the Reichstag in 1924 and joined the National Socialist party 3 years later.

Revenue, Public, see PUBLIC REVENUE.

Reverberatory Furnace, see FURNACES.

Revere, Paul (1735-1818), Amer. patriot, b. Boston, Massachusetts. He served as a soldier, became a gold- and silversmith in Boston, where he printed the paper money ordered by Congress in 1775 and estab. a powder-mill, took part in the 'Boston Tea Party' (1773), and became a member of the Boston 'Anti-Brit. Society.' His midnight ride to Lexington and Concord (April 1775) to warn the people of the approach of the Brit. troops was rendered famous by Longfellow's poem, *The Midnight Ride of Paul Revere*. In 1801 he founded the R. Copper Company at Canton, Massachusetts. See lives by C. F. Gettemy, 1905; H. O'Brien, 1929; and Esther Forbes, 1942.

Revere, tn and holiday resort of Suffolk co., Massachusetts, U.S.A., 5 m. NNE. of Boston. It has printing and sugar refining industries, and optical goods

castings, ribbon, and processed foods are manufactured. Pop. 36,763.

Reverend, title of respect generally accorded to all clergy and ministers of religion, though it has sometimes been repudiated by certain Protestant ministers. Rom. Catholic priests are addressed 'Reverend Father' and mothers superior 'Reverend Mother.' Deans are spoken of as 'Very Reverend,' bishops as 'Right Reverend,' archbishops as 'Most Reverend.' In Scotland the title 'Right Reverend' is applied to the Moderator of the General Assembly of the Church of Scotland.

Reversed Trades, *see* ANTI-TRADES.

Reversing Layer, in astronomy, stratum of the sun's atmosphere whose absorption of the light from the photosphere produces some of the dark lines of the spectrum. The layer, which was discovered by Young in 1870, is at a lower temp. than the photosphere upon which it lies, but is itself incandescent. *See* SUN.

Reversion, in law, returning of an estate to the grantor or his heirs, after a particular estate is ended; e.g. if A gives a life estate to B out of his fee simple estate of Blackacre, the R. will be in A's heirs, and similarly the R. of the fee simple will be in the grantor and his heirs of a fee tail by mere implication of law and without any express reservation (*see* ESTATE; FEE). The interest of a landlord after the expiration of a lease is also called the R. In Scots law, R. as applied to heritage is a right of redemption, and is either legal, i.e. that which the law provides of its own motion, or conventional, i.e. that of a wadset or heritable bond entitling the debtor to 'disencumber' the estate.

Reversion, in heredity, name given to the biological fact that the species revert in some of their peculiarities to ancestral forms. Children, for example, often revert in certain particulars, both physical and moral, to their grandparents, or even more remote ancestry; again, Darwin considered that the slaty-blue pigeons which occasionally appear in all breeds are an instance of R., and that the inference of such fact may be drawn from the number of the markings correlated with the blue tint, because of the improbability that all the markings would appear together from a simple variation (*see* DARWINISM). The appearance of a certain characteristic in an organism may depend upon the presence of rev. different genes (*see* MENDELISM) in the fertilised egg from which the organism developed. In succeeding generations these genes may become separated, and their subsequent accidental recombination will cause the reappearance, or R., of the characteristic. The hidden character of R. after 3-4 generations may be simply explained by the recessive gene (*see* HEREDITY). In contrast to the views of Darwin, the tendency at the present time is to regard the occasional appearance of a tail, or supernumerary nipples, in humans as being mere accidents of development, rather than as examples of R. to the ancestral condition. Similarly, the simple brain

and low mental capacity of a microcephalous idiot are more probably caused by a defect in development than by a R. to an ape-like ancestor. In medicine the term R. is used to denote the recurrence of a disease which has not revealed itself during intermediate generations. *See also* ATAVISM; HEREDITY.

Reversion Duty, *see* LAND TAXES.

Revillagigedo Islands, group of 3 uninhabited rocky is. in the Pacific Ocean, off the W. coast of Mexico, about 19° N. and 111° W., belonging to the Mexican state of Colima. The is. are named after a famous 18th-cent. viceroys. Total area is 320 sq. m., including the is. of Socorro, San Benedicto, and Clarion. There is no permanent pop.

Revival (of religion), name given to various religious movements which caused a renewal of zeal and fervour in the cause of religion, e.g. the crusades, the Franciscan movement of the 13th cent., and the early work of the Jesuits. The term, however, is a modern one, and is perhaps best used only in its modern connection. In this case R.s are a feature of Protestant church life by which, under the influence of vigorous and fervid preaching, conversion of heart is felt by the unconverted and additional zeal is stimulated in church members. The 'Great Awakening' was the great R. of America, and is specially connected with the name of Jonathan Edwards. In England the names of Wesley, Whitefield, Moody and Sankey, Evan Roberts, Torrey, and Alexander are well known in connection with religious R.s. Revivalists in America sometimes adopt theatrical methods, and the more sensational of these are there called 'Hot Gospelers.' In 1954 Dr W. F. Graham (q.v.) conducted a remarkable evangelical campaign in London, his meetings being attended by thousands. He was by no means a 'Hot Gospelers,' but used modern publicity methods in a discreet but effective manner with immense success.

Revival of Learning, *see* RENAISSANCE.

Revocation. In the law of contract an offer may be revoked at any time before acceptance, for it is acceptance that binds the parties contractually. An offer is accepted when the acceptance is communicated: this means more than a tacit formation of intention; there must be some overt act or speech to give evidence of that intention; but in any case acceptance is 'communicated' when it is made in a manner prescribed or indicated by the offeror, and therefore acceptance may be held to be communicated and the contract made though the acceptance has not come within the knowledge of the offeror. But an exception to this general rule as to the revocability of an offer must be made in the case of an offer under seal. Such an offer cannot be revoked: even though it is not communicated to the offeree it remains open for his acceptance when he becomes aware of its existence. A R. (as distinct from lapse for want of acceptance) is inoperative until communicated, and the withdrawal of an offer

is not 'communicated' by the mere posting of a letter. Consequently an acceptance made by post is not affected by the fact that a letter of R. is on its way. The above is the general rule, though there have been precedents which suggest a modification when the offer is one to sell property and the R. takes the form of a sale of the property to a third person. In business there must be many offers which do not contemplate an immediate acceptance; a reasonable time is here allowed during which the offer is continuing, and a mental R. would not avail against an acceptance made within such time.

In the law of principal and agent the relation of principal and agent is founded on mutual consent, and therefore may be terminated by the same process which originated it, the agreement of the parties. Where the authority of an agent is determined by R., such R. is a 'condition subsequent' of the contract of agency; i.e. it is a term in the original contract of employment. The principal's right, however, to revoke is affected by the interests of: (1) third parties; (2) the agent. (1) A principal may not privately limit or revoke an authority which he has allowed his agent publicly to assume. He will be bound by the acts of the agent which he has given other persons reason to suppose are done by his authority. (2) If the employment is in its nature such that the authority cannot be revoked without loss to the agent, the principal may not revoke. This rule may be regarded as identical with a rule of a more limited significance, that an authority coupled with an interest is irrevocable. Authorities given to an agent to pay to a third party a debt which he owes to his principal, or to sell lands and pay himself a debt due to him out of the proceeds, are instances in which an authority has been held to be irrevocable by reason of interest. For R. of will see WILLs, and for R. of patents see PATENTS, *Revocation*. See W. R. Anson, *Principles of the English Law of Contract* (19th ed.), 1945; W. Bowstead, *Digest of the Law of Agency* (11th ed.), 1951.

Revolution, a change in the internal constitution and gov. of a country brought about by the concerted action of the inhab. R.s are usually but not necessarily violent—hence 'bloodless revolution.' Among the more important R.s in the world's hist. are the R. in England in 1688, when William of Orange came to rule over Britain; the Amer. R. of 1776, when Britain was obliged to give America her independence; the Fr. R. of 1789; and the Russian R. of 1917. The change of Britain from an agric. into an industrial country is known as the Industrial R. (q.v.). For details of R.s see hist. section of FRANCE, U.S.A., etc.

Revolution of 1905, in Russia, was the culmination of 2 movements—the constitutional movement of the Zemstvos (q.v.) and the liberal intelligentsia in general, and the revolutionary movement of the underground parties, chiefly the

Russian Social Democratic Labour Party (q.v.) and the Socialist Revolutionaries (q.v.). The R. started with the 'Bloody Sunday' in Jan., when a workers' demonstration was fired on in St Petersburg. This was followed by country-wide open political agitation, the appearance of Soviets (see SOVIET), political strikes, including the general strike of Oct. 1905, seizure by the peasants of landlords' estates, mutinies in the Armed Forces (e.g. the battleship *Potëmkin*), armed uprisings, including one in Moscow in Dec. 1905, and the virtual breakdown of authority in parts of the country, in some cases for sev. weeks. General unrest lasted till the summer of 1907. The main results of the R. were the estab. of a constitutional regime (imperial manifesto of Oct. 1907), with a legislative Duma (q.v.), the legalisation of political parties and trade unions, the impetus it gave to Stolypin's (q.v.) agrarian reform, and the disillusionment of the progressive section of the intelligentsia with revolutionism (see INTELLIGENTSIA: VEKHI).

Revolvers. Pistols (q.v.) have been superseded by R., except for target practice. A revolver is a single-barrelled pistol having a revolving breech, which contains sev. chambers for cartridges. The breech was originally revolved by hand, but in 1835 the first practical revolver was produced by S. Colt, an American. In the Eng. revolver the pull of the trigger, in the Amer. type the cocking of the hammer, revolved the cylinder; the first double-action revolver, in which either of these principles could be employed, was produced in 1855. Rim-fire, pin-fire, and central-fire cartridges were successfully invented, the last being in general use save for small-calibre R. The revolver is designed for quick use at close quarters, and is mainly a weapon of defence. Both Colt and Adams R. were used in the Crimean war, and later were adopted by the Navy. The U.S.A. is regarded as the home of the revolver, and during the Civil war whole corps were armed with 4 R. each man. The action of reloading being comparatively slow, they were no match against corps armed with repeating carbines. Enfield, 'Colt', and Smith & Wesson revolvers were all used in the British Service during the Second World War. Webleys make the Naval 455 pistol self-loader. See also FIREARMS.

'**Revue des Deux Mondes, La**,' Fr. review, most outstanding of all Fr. bi-monthly periodicals. It was founded in 1829 by Ségur-Dupeyron and Mouroy, and later taken over by Buloz, under whose direction (which continued for over 40 years) it acquired an enormous following. In its origin the review was purely literary, but afterwards opened its columns to scientific discussion, political hist., and current politics. Its attitude is moderately conservative and nationalist. Well-known contemporary personalities in literature and politics are among its contributors.

Reward, return for some voluntary act; but the corrupt taking or advertising of R.s may bring the offender within the criminal law. Advertising a R. for the return of stolen or lost articles is lawful, but to add words to the effect that no questions will be asked or inquiries made renders the person so advertising liable to a penalty of £50. No action for this offence can be brought against the printer or publisher of a newspaper containing such an advertisement, except with the leave of the attorney- or solicitor-general, and not at all after the expiration of 6

printed books and 10,500 MSS.), and a museum of Icelandic antiquities. In 1945 the heating of R. by piped water from the hot springs and geysers was completed. R. was the H.Q. of the allied occupation force during the Second World War. It is the prin. port of Iceland, occupied in fishing and allied industries, shipbuilding, and other trades. There is an airport 20 m. WSW. Pop. (1954) 62,035.

Reymont, Wladyslaw Stanislaw (1867-1925), Polish novelist, b. Kobile Wielkie, Piotrkow, of peasant extraction. He was



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months from the pub. A person may be punished as for larceny who *corruptly* takes a R., i.e. takes the R. under pretence of helping to recover stolen property, but does not 'use all due diligence to cause the thief to be brought to trial.' Apparently keeping property back, like a cheque, the ownership of which is clear, in the expectation of the offer of a R., is not criminally punishable, but would certainly render the person doing so liable to damages for detention.

Reykjavik, tn and cap. of Iceland, on the SW. coast at the head of the Faxa Fjord. R. is of Viking foundation, estab. by Ingolf in 874 (see ICELAND, *History*), but the present tn is largely modern. It has a cathedral, a univ. (inaugurated in 1911) with some 800 students, the 'Althing,' or Parliament house, the National Library (with 200,000

expelled from a Russian school for pro-Polish utterances, and he was successively telegraph operator, actor, railwayman, and novice in a monastery. After publishing some novels of theatrical life he wrote his tetralogy, *The Peasants*, the parts being *Autumn*, 1902, *Winter*, 1904, *Spring*, 1906, and *Summer*, 1909. This was remarkable for its realism and skilful characterisation of the Polish peasantry, and won R. the Nobel prize in 1924. Among his other works were *The Promised Land*, 1899, *The Year 1794*, 1913-18, and *The Revolt*, 1924. See lives by Z. Falkowski, 1929, and J. Krzyzanowski, 1937.

Reynard the Fox, see FABLE.

Reynaud, Paul (1878-), Fr. statesman, b. Barcelonnette, Basses-Alpes. He became a successful lawyer at the Paris Bar, and entered politics in 1919, joining Flandin's right-wing Democratic Alliance.

He was 52 before he held his first ministerial office, and was minister of colonies, justice, and finance in various Flandin and Tardieu govts. after 1930 and minister of finance under Daladier (q.v.) from 1938 to 1940. He improved the nation's financial situation by decrees increasing taxation and by economies in public works expenditure. He was critical of the appeasement policy, and, after the Munich Pact (q.v.), broke away from Flandin's pro-appeasement party and remained an independent thereafter. He won a considerable reputation by his speeches calling for a vigorous conduct of the war, becoming Prime Minister, 23 Mar. 1940, in succession to Daladier, who had signed the Munich Pact. On the collapse of France, however, he was overthrown by the Pétain regime and unjustly made the scapegoat for France's unreadiness for war. He fought against the capitulation at Bordeaux and was subsequently imprisoned by Pétain and later deported to Germany. In Aug. 1948 he took office for the first time since 1940 as minister of finance under Marie, but was out of office the same month. From 1953 to 1954 he was Deputy Premier under Laniel. He has played a leading part in the affairs of the Council of Europe. Pubs. include *Au Cœur de la Mêlée, 1930-45, 1952* (Eng. trans. 1955).

Reynolds, John Fulton (1820-63), Amer. general, b. Lancaster, Pennsylvania. He served in the Mexican war, and in the Civil war distinguished himself at Fredericksburg, and led the van at Gettysburg, where he was mortally wounded.

Reynolds, Sir Joshua (1723-92), portrait painter, b. Plympton, Devon. His father was headmaster of the local grammar school. While very young he showed great artistic talent, and in 1740 his family sent him to study under Hudson, a leading contemporary portrait painter. He returned to Devon, where he painted over 20 portraits, and later visited Italy and the Mediterranean, where he studied the It. old masters and became a lifelong admirer of Raphael, from whom he derived much of his skill in design and treatment of flesh and materials. R. then settled in London. He lived in Great Newport Street until 1760, and then took a house in Leicester Fields. He was soon acknowledged as the finest portrait painter in England; he executed portraits of persons so diverse as George III, Laurence Sterne, Dr Johnson, Garrick, Lady Sarah Bunbury, and Kitty Fisher.

In 1768 R. was appointed president of the newly-founded Royal Academy, and was knighted in the following year. For the remainder of his life he exhibited many of his most famous paintings in the Royal Academy's gallery. R.'s encouragement of new talent was constant and generous; he founded the Royal Academy Schools, giving his first lecture to students there in 1769. He also suggested the foundation of the Royal Academy banquet, and the appointment as honorary profs. of the Academy

of leading figures of the day. Of his written work, the *Discourses* (pub. in Everyman's Library) contain advice which is still valuable to students of painting. R.'s literary interests were wide. He was the founder of the Literary Club, and a close friend of Dr Johnson.



SIR JOSHUA REYNOLDS

Engraving after a self-portrait.

R. painted many historical themes, but he is remembered chiefly for his portraits. His draughtsmanship was superb, and he possessed a wonderful sense of colour. He followed da Vinci in never ceasing to experiment in new colour combinations and effects, and, like da Vinci, his efforts have resulted in the deterioration of some of his pictures, though in others the rich tones remain to justify his inventiveness. R. also possessed, though to a lesser degree, Rembrandt's gift of chiaroscuro, and, in the Eng. portraiture tradition, he is the successor of Van Dyck in his graceful studies of the aristocracy, though in detail of style he is not so close to Van Dyck as to Gainsborough.

See ed. of R.'s work with life by E. Malone, 1798. See also lives by J. Northcote, 1819; Sir C. Phillips, 1894; Sir W. Armstrong, 1900; M. Osborn, 1908; F. Rutter, 1923; A. Dayot, 1931; and J. Steegman, 1933.

'**Reynolds News**,' Sunday newspaper, founded 5 May 1850 by George Wm McArthur Reynolds, eminent Chartist politician and prolific novelist, who ed. the paper from 1850 until his death in 1879. Estab. to 'defend the rights of the masses,' R. N. was a powerful champion of trade unionism. The paper was purchased by the Co-operative movement in 1929, and is now the only Sunday Labour and Co-operative newspaper. While covering general Sunday paper topics, it concentrates particularly on political and foreign news and comment.

Reza Shah Pahlavi (1877-1944), founder of the Pahlavi dynasty, the reigning house of Persia. He served from an early age in the Cossack brigade of the army, eventually becoming its colonel. Following a *coup d'état* in 1921, when the brigade marched into Tehran unopposed, he became commander-in-chief and minister for war. In 1923 he became Prime Minister. Ahmad Shah was prevailed upon to make another journey to Europe, whence he did not return to Persia. On 12 Dec. 1925 the constitution was modified to exclude the Qajar dynasty, and it accepted the throne and was crowned the following year. R. carried out a vigorous policy of westernisation. The finances of the country were reorganised, under the direction of Dr Millspaugh, who headed an Amer. advisory mission to Persia (1922-7); the armed forces were expanded, and conscription introduced; communications were improved, and the Trans-Iranian Railway built at a cost of some £30m.; industrial development was encouraged; women were unveiled and European dress made compulsory for both sexes in 1936; legal reforms were introduced, and the capitulations (q.v.) abolished; and the educational system was expanded. In 1932 the Anglo-Persian Oil Concession was denounced; after reference to the League of Nations a new agreement was signed in 1933, by which the concession area was reduced and the royalty payment increased. When war broke out in 1939 Persia declared her neutrality. In 1941 allied forces entered Persia after the Persian gov. had failed to comply with allied demands for the expulsion of Ger. nationals. R. abdicated in favour of his son, Mohammad Reza. See also PERSIA, History.

Reza'iyeh, formerly known as Urmia, dist. and tn in the Persian prov. of Azarbaijan. It is a fertile, well-cultivated dist. The tn is 80 m. SW. of Tabriz. It was formerly the see of a Nestorian bishop, and is supposed by some to have been the bp. of Zoroaster. Pop. (of dist) 133,700; (of tn) 52,000.

Reza'iyeh, formerly known as Urmia, Urmia, or Daria Shah, lake of Persia, in the prov. of Azarbaijan, situated in a depression between the mts at a height of 4500 ft. It is very salty and is fed by a number of streams, including the Aji Chay, Jaghatu Chay, and Zula Chay. Its outlet is unknown. Its length is about 80 m., breadth 20-30 m., and area 1600 sq. m.

Rhabanus Magnentius, see RABANUS.

Rhabdomancy, see DIVINATION and DIVINING ROD.

Rhadamanthus, son of Zeus and Europa, who, for his justice, was made a judge of the dead.

Rhaetia, see RAETIA.

Rhaetian Alps, div. of the Alps, lying to the N. of Lombardy, Italy, and between the R. Adige to the W. and the Inn to the E. The chief heights are the Piz Bernina (13,044 ft), the Piz Roseg (12,936 ft), and the Orteler Spitze (12,800 ft).

Rhaetic Beds, uppermost formations of the Triassic system. They are composed

of red, green, and grey marls, black shales, sandstones, bone-beds, and exhibit thin coal seams in Germany. They are also known as the *Avicula contorta* beds from one of the characteristic fossils, and also as White Lias; other fossils are *Cardium Rh.*, *Pecten valoni*, *Pullastra arenicola*, *Saurians*, *Microlestes*, etc. In England they extend from Devonshire, through Bristol, to the coast of N. Yorks; on the Continent they are found in Germany, France, Italy, and the Rhaetian Alps.

Rhaeto-Romance Languages, see ROMANSCHE.

Rhagae, or Rhages, see RAI.

Rhamnaceae, see BUCKTHORN.

Rhamnus (mod. *Obrio Kastro*), seaport of the tribe Aenatis in NE. Attica, anc. Greece, 25 m. from Athens, on the road from Marathon to Oropus. It derived its name from a kind of prickly shrub (*rhamnos*). It was famed for its temple and colossal statue of Nemesis, the 'Rhamnusia virgo' or 'dea' of Ovid and Catullus. In 1891 ruins of a small temple to Dionysus and a theatre were discovered. A statue of Themis was found in another temple near by.

Rhamphastidae, see TOUCANS.

Rhampsinitus, classical form of the Egyptian Ramesses, probably to be identified with Ramesses III, King of Egypt (12th cent. BC). Herodotus (ii. 121) tells the story of the theft by 2 brothers of treasure stored in the king's treasury (at Medmet Habn in Thebes). Most collections of European folk-tales contain similar stories of *The Master Thief*. Some consider the tale to be of Egyptian origin. See Kohler, *Orient and Occident*, 1864; W. A. Clouston, *Popular Tales and Fictions*, 1887; G. Maspero, *Contes populaires de l'Égypte ancienne*, 1889; *Gesta Romanorum*.

Rhapsodists, originally epic poets of anc. Greece who recited their own verses in public; but by the 6th cent. BC the term was generally used of the professional reciters of other people's poems, especially those who declaimed the poems of Homer at various festivals, without instrumental accompaniment, merely holding a branch of bay in the hand.

Rhapsody, originally a recited or chanted poem, especially an epic one; but the term became adapted to music of a declamatory character and later, by derivation therefrom, to compositions of an eloquent kind cast in no definite form. The temptation thus arose to call any shapeless work, or any work whose form could not be classified, a R., but good compositions of that kind have, like all good works of art, a satisfactory form of their own, though it may not lend itself to classification.

Rhatany, or *Krameria triandra*, half-shrubby leucuminous plant found on the dry, gravelly soil of Peru. The root is excessively astringent, and is exported to Europe on that account; its powder, mixed with charcoal, forms excellent tooth-powder.

Rhayader, mrkt tn of Radnorshire, Wales, on the Wye, about 40 m. NW. of Hereford. It is a centre for the sale of sheep and farm produce generally. Some 4 m. away, among the hills, are the great reservoirs which constitute Birmingham's water supply. Pop. 1000.

Rhazes (Abu Bakr Muhammad ibn Zakariyah Al-Razi) (850-923), Persian physician, b. al-Razy, near Tehran. In early life he was a musician, physiotherapist, and alchemist, and did not commence the study of medicine until after the age of 30, but he became one of the great figures in Arabian medicine. He was a great bedside teacher, ranking in importance with Hippocrates and Galen. He wrote 117 medical and 104 non-medical books. His most important medical works were the *Al-Hawi* or *Continens*, a great encyclopaedia of medicine in 25 books, first printed in Latin in 1486, and the *Liber Almansoris*, named after the prince Al Mansur, a compilation from various earlier writers, showing how completely (Arabic) medicine was transmitted to the Arabs; it was first printed in 1476. R. gave the first medical descriptions of smallpox and measles, and was the first to devote an entire treatise to the diseases of children. He was a man of deep sympathy and gave vast sums to the poor; he died blind and impoverished. See C. Elgood, *Medical History of Persia*, 1951.

Rhe, Ile de, see RÉ, ÎLE DE.

Rhea, daughter of Uranus and Gaia, wife of Cronus (Saturn), and mother of Zeus, Poseidon, Hades, Hera, Demeter, and Hestia (Vesta). Her cult probably originated in Crete. She was an earth-goddess and type of the fruitfulness of nature. As the 'mother of the gods' she was identified with the Asiatic Cybele (q.v.).

Rhea, or **South American Ostrich**, family Rheidae, order Rheiformes, with 3 toes to the foot, a feathered head and neck, small, well-feathered wings, and rudimentary tail. Two species are identified: *R. americana*, which has been slaughtered in enormous numbers in recent years, though attempts have been made with considerable success to domesticate it. The other species is Darwin's *R. (Pterocnemia pennata)*, which is smaller in size, has shorter legs, feathered to the tarsus, and has the plumage mottled or less uniform in colour. It occurs in Patagonia. See Darwin, *Naturalist's Voyage*.

Rhea Fibre, see BOEHMERIA.

Rhea Sylvia, or **Rhea**, daughter of Numitor and mother by Mars of Romulus and Remus. King Amulius had forced her to become a vestal virgin, so when she bore twins he had her drowned; she became a goddess and the wife of the Anio.

Rhee, Syngman (1875-), Korean statesman, educ. at the Methodist Mission School, Seoul, and Harvard and Princeton Univs., U.S.A. He began his political agitation while still a student, and was imprisoned 1897-1904. After 6 years in

the U.S.A., R. went back to Korea as a Y.M.C.A. worker. But his campaign against Jap. occupation of Korea forced him to take refuge in Hawaii, where he founded the Korean Methodist Church. For the next 30 years R. worked unceasingly for Korean independence, and after the Jap. defeat in 1945 he returned to Korea. He was elected to the National Assembly as a Liberal in 1948, and was elected first President of Korea in July of that year. He was re-elected in 1952 and 1956. By 1956 it was evident that notwithstanding R.'s unique position as Korea's elder statesman, and as the national leader who had led his people to victory in the war of 1950-3, his conduct of home affairs was seriously undermining his popularity. R.'s sincerity and single-minded patriotism are unquestionable; but his high-handed actions have frequently caused his W. allies great embarrassment, as in June-July 1953, when his attitude endangered the conclusion of an armistice in Korea. See also KOREAN WAR.

Rhegium, see REGGIO DI CALABRIA.

Rheims, see REIMS.

Rhein, see RHINE.

Rheinberger, Josef (1839-1901), Ger. organist and composer, b. Vaduz, Liechtenstein, studied at the Conservatory of Munich, where he remained until his death, teaching, conducting, and occupying posts as organist and director of church music. He was especially prolific in choral music, both sacred and secular, and although he wrote 4 operas, orchestral, chamber, and piano music, it is for his organ works (including 20 sonatas) that he is best known. See life by G. T. Kroger, 1916.

Rheine, Ger. tn in the *Land* of North-Rhine-Westphalia (q.v.), on the Ems (q.v.), 78 m. NNE. of Düsseldorf. In medieval times it was the cap. of a small principality. It has a 15th-cent. church, a 17th-cent. bridge, and baroque houses. The tn is a spa, and there are textile and salt industries. Pop. 41,000.

Rheingau, dist. of Hessen (q.v.), Germany, on the r. b. of the Rhine (q.v.), S. of the Taunus Mts (q.v.). Rüdesheim is in the W. of the dist. and Wiesbaden in the E. (qq.v.). Most of the finest Rhine wines comes from the R.

Rheinhausen, Ger. riv. port in the *Land* of North-Rhine-Westphalia, on the Rhine opposite Duisburg (q.v.). The prin. industries are connected with coal, iron, and steel; there are also machinery, instrument, concrete, and textile manufs. F. A. Krupp (1854-1902) estab. ironworks here in 1896. Until 1945 R. was in Rhine prov., Prussia. Pop. 42,800.

Rheinland-Pfalz, see RHEINLAND-PALATINATE.

Rheinlande, see RHINE PROVINCE.

Rhenanus, Beatus (1485-1547), Ger. humanist, b. Reinach. He studied at Paris and then at Basel, where he began a lifelong friendship with Erasmus. He wrote *Reverendiarum Germanicarum*, libri iii, 1531, and ed. the works of Erasmus, 1540-1, besides those of Pliny, Tacitus, etc.

Rhenish Architecture, see GERMAN ARCHITECTURE.

Rhenish Prussia, see RHINE PROVINCE.

Rhenish Wine, anct name for Hock (q.v.).

Rhenium, metallic chemical element, symbol Re, atomic number 75, atomic weight 186.3. It was discovered by Noddack and Tacke in 1925, in certain platinum ores. R. is a grey metal, sp. gr. 20, with a very high melting point. It has so far found no industrial application, but potassium perhenate, $KReO_4$, can now be obtained with comparative ease, so that commercial uses may follow. Chemically R. is similar to manganese.

Rhenus, see RHINE.

Rheology, study of the deformation and flow of matter. If forces are applied to many kinds of solids in such a way as to change their shapes, and the changes are not too large, practically complete recovery occurs when the forces are removed. Examples of such solids are metals, most crystals, wood, etc. Other materials, such as putty, butter, pitch, clay, etc., may be deformed by even small forces, and afterwards show incomplete recovery of shape. Moreover, although they resemble liquids in that they can flow under the continued action of forces, these materials do not behave merely as ordinary viscous liquids, for which the laws of flow are simpler and have long been known. See also ELASTICITY; VISCOSITY.

Rheostat, apparatus with electrical resistance adjustable between certain limits. It may consist of a pile of carbon plates, the contacts between which can be varied by pressure exercised by screw presses at the ends, or a length of wire wound on a ceramic core with a contact sliding along the coils. In one type the circuit is connected with a movable arm, the free end of which is moved over a series of brass studs, each connected with a resistance coil and the end one with the circuit. Liquid R.s have 2 electrode plates immersed in a liquid; either one plate is fixed and the other movable horizontally so as to vary the volume of liquid between the two, or both may be lifted or lowered together.

Rhesus (Rh) Factor, substance (agglutinin) first discovered in 1940 in the red blood cells of the Rhesus monkey, whence the name of R. F. is derived; it is present also in 85 per cent of humans, who are said to be Rh +, the remaining 15 per cent being Rh -. The R. F. is inherited, and the offspring of an Rh + father and Rh - mother may itself be Rh +. The Rh - mother reacts to the presence of the Rh + foetus by producing an agglutinin in her blood plasma. This agglutinin causes agglutination and destruction of Rh + red cells in a subsequent foetus, with results which are frequently fatal for the child (see OBSTETRICS, *Haemolytic Disease of the New Born*). A similar undesirable reaction occurs if an Rh - person, previously sensitised by a transfusion of Rh + blood, is subsequently given a

further transfusion of Rh + blood. See *The Red Blood Groups* (Medical Research Council memorandum), 1948.

Rhesus Monkey, or *Boonder* (*Macaca mulatta*), macaque or catarrhine monkey common to N. India, in some parts of which it is attached to temples and regarded as sacred. It is from 18 in. to 2 ft long, with a tail of 7 or 8 in. The hair is straight and fairly long, and is greyish or greenish brown. The face is flesh-coloured and the callosities bright red. This species is commonly kept as a pet, and is much used for research work in physiology. See RHESUS FACTOR.

Rheticus (real name, *George Joachim*) (1514-76), Ger. mathematician and astronomer, b. Koldkirch, gave up his professorship of mathematics at Wittenberg for a time in order to supervise for Copernicus at Frauenberg the printing of *De Orbium Revolutionibus*, whose principles he enthusiastically endorsed. He is noted for the comprehensive and accurate tables of sines, cosines, and tangents, etc., calculated for every 10 sec. and to 10 places in his *Opus Palatinum de Triangulis*, pub. in 1596. He wrote the first account of the Copernican theory, *Narratio prima de libris revolutionum Copernici*, 1540.

Rhetoric (Gk *rhōtorikē*), originally the art of speaking effectively in public, but afterwards the meaning was extended so as to comprehend the theory of eloquence, whether spoken or written. It was first arranged and developed by the Greeks of Sicily, and Corax of Syracuse (c. 500 BC) is said to have been its originator. The earliest of the famous 10 Attic orators was Antiphon. The earliest, however, really to make R. a methodical study was Isocrates, who defined his subject as 'the science of persuasion.' The greatest work on the subject of either ant or modern times is a treatise by Aristotle. He defines R. as the faculty of perceiving on any given subject what is best adapted to persuade. He then divides it into 3 parts: Persuasion, Language or Expression, and Arrangement. The peripatetic school followed Aristotle's method; but about 300 BC it was superseded by the Asiatic method, which in its turn was displaced by that of the school of Rhodes. Finally, the centre of rhetorical study shifted to Rome. Among the Rom. writers Cicero in his *De Oratore*, 55 BC, emphasises the relation between R. and philosophy, and this view was further developed by Quintilian in his *Institutio Oratoria*, which describes at length the training for R. During the Middle Ages R. was a key subject in univ. education. The Renaissance revived interest in Gk models, but in the 18th and 19th cents. the art of R. declined, and it became merely part of training for law, politics, or the ministry. See also ORATORY. There were treatises on the art of R. by L. Cox, 1524, and T. Wilson, 1553; see also works on the philosophy of R. by J. Bascom, 1885, and I. A. Richards, 1936. See also ELOCUTION.

Rhetorical Question is a question put, not in order to get an answer, but as a

more striking substitute for a negative statement, as in Gray's lines:

'What female heart can gold despise,
What cat's averse to fish?'

See also FIGURE OF SPEECH.

Rheum, see RHUBARB.

Rheumatism, specific disease characterised by fever, inflammation of the joints, and a tendency to involve the heart. Ill-defined aches and pains in various parts of the body have been popularly labelled as R., partly from misconception and partly because it is a convenient term to apply to pains of which the true cause is not readily apparent. Likewise rheumatoid arthritis, osteo-arthritis, 'muscular rheumatism' (such as lumbago), and sciatica are not due to true R. They are fully described under their separate headings. R. is caused by bacterial infection and nearly always by the streptococcus, although gonorrhoeal R. does occur (see GONORRHOEA). The disease in its acute form is typified by rheumatic fever, which is caused by the streptococcus. Most common in children and adolescents, rheumatic fever starts as a rule with a sore throat, malaise, fever, sweating, and very soon one or more joints becomes inflamed, swollen, and painful. Less commonly the muscles are involved rather than the joints. The pulse rate is considerably raised, and unless the infection is speedily checked it spreads to the heart (see CARDITIS). Recovery is slow, and convalescence must be extremely gradual, lest over-exertion should strain the heart. Many cases are left with a permanent weakness of one of the heart valves—usually the mitral valve—and the great majority of cases of valvular disease of the heart (V.D.H.) in adult life owe their origin to an attack of rheumatic fever in childhood. Rheumatic fever is apt to recur, and before modern treatments were available it was common to find patients with a history of 2 or 3 or more attacks of the disease. The acute form may lapse into a sub-acute or chronic form, with relapses into the acute stage from time to time. The salicylates given internally are specific in the treatment of R., either in the form of the sodium salt or of acetylsalicylic acid (aspirin), and externally methyl salicylate (wintergreen) may be applied with relief to inflamed joints. These treatments, however, have been superseded by penicillin as the main treatment for R. If given at the first sign of the illness, penicillin will abort the attack, but it must be persevered with for several weeks owing to the tendency to relapse. The incidence of rheumatic fever in Britain and in some other countries has fallen remarkably in the last 50 years, and has continued to fall since the Second World War. However, it is probable that about 4000 new cases occur each year in England and Wales. It is a disease associated particularly with overcrowding and poor housing conditions. Cold and damp are aggravating factors, but do not in themselves cause R. Largely an illness of cities, nevertheless some rural housing

conditions are no better, or even worse, than their urban counterparts. It is certain that the greatly improved standards of living in recent years have been the main factor in the lessened incidence of R., and it is reasonable to insist that continued improvement must be the principal aim in its prevention. Chorea, or St Vitus's dance (q.v.), is a form of R. which attacks the nervous system. See Lord Horder and E. G. L. Bywaters, in W. S. C. Copeman's *Textbook of the Rheumatic Diseases*, 1955.

Rheydt, Ger. tn in the *Land* of North Rhine-Westphalia (q.v.), 15 m. W. by S. of Dusseldorf (q.v.). From 1929 to 1933 it was amalgamated with Mönchengladbach (q.v.). There is a splendid Renaissance castle, now a museum, and there are silk, velvet, machinery, and footwear manufs. Goebbels (q.v.) was b. here. Pop. 80,000.

Rhin, Bas., dept of NE. France, formed of part of the old prov. of Alsace. It is on the Rhine and the Ger. frontier. In the W. are the Vosges, covered with forests of beech- and fir-trees. The plains are very fertile, producing cereals, tobacco, hops, beets, fruit, and livestock. Vines are grown on the hill slopes, and the wines of Alsace are famous. There is much heavy industry, coal, iron, and oil, and numerous manufactures, including machinery, textiles, chemicals, and pottery. The prin. tns are Strasburg (the cap.), Erstein, Haguenau, Molsheim, Saverne, Sélestat, and Wissembourg (qq.v.). Area 1848 sq. m. Pop. 708,000. See also ALSACE-LORRAINE.

Rhin, Haut-, dept of France, formed of part of Alsace (q.v.). The Rhine forms the W. boundary of the dept, which is fertile and densely wooded. Cereals, vines, and hops are grown. There are a great number of industries; textiles, machinery, and foodstuffs are manuf., and there are potash mines and factories. The prin. tns are Colmar (the cap.), Altkirch, Guebwiller, Mulhouse, Ribeauvillé, and Thann (qq.v.). Area 1354 sq. m. Pop. 509,500. See also ALSACE-LORRAINE.

Rhine (Lat. *Rhenus*; Ger. *Rhein*; Fr. *Rhin*; Dutch *Rijn*), one of the great rivs. of Europe, flowing through Switzerland, Germany, and Holland. Its length is 850 m., of which 437 m. are in Germany. It drains an area of some 80,000 sq. m., and it is navigable for 550 m. of its course. It is connected to the Black Sea by the R.-Main-Danube canal, and to the Mediterranean by the R.-Rhône canal (q.v.). The R. rises in 2 headstreams called the *Vorderrhein* and the *Hinterrhein* (and other glacial streamlets) in the Swiss canton of Grisons (q.v.). It runs NW.—forming for part of its course the border between Switzerland and Liechtenstein and Austria—to and through Lake Constance (q.v.), over the falls at Schaffhausen (q.v.), then S. and W. to be joined by the Aare (q.v.). In this part of its course it separates Germany (on the N.) from Switzerland (on the S.). After Basel (q.v.) it turns N., through a wide valley, to Mainz (q.v.); flowing at first between Alsace-Lorraine

(q.v.) in France and Baden-Württemberg (q.v.) in Germany, and later between the Ger. *Länder* of Rhineland-Palatinate (on the l. b.) and Baden-Württemberg and Hessen (on the r. b.). From Mainz it flows W. to Bingen (q.v.), and then generally NNW, past Koblenz to Bonn (q.v.). The stretch of the riv. between Bingen and Bonn is the R. of legend (see *LORELEI*; *NIBELUNGENLIED*), with woods, vineyards, and Gothic castles on its wild and romantic banks. From Bonn the riv. flows past Cologne, Düsseldorf, and Duisburg (qq.v.), and enters Holland NW. of Emmerich (q.v.). It is joined by the Moselle at Koblenz, and by the Ruhr at Duisburg (qq.v.); other important confluent in this part of its course are the Nahe and the Lahn (qq.v.). On entering the low plains of Holland it begins to divide into sev. branches, forming a great delta. Of the 2 main branches, the N., the Neder Rijn, was formerly the main stream: from it the IJssel (q.v.) branches off at Arnhem, and the Oude Rijn at Wijk. (At Utrecht, q.v., the Oude Rijn subdivides into the Kromme Rijn, which enters the North Sea at Katwijk, and the Vecht, which enters the IJsselmeer.) The second of the main branches of the R., the S. and prin. stream, is the Waal (q.v.).

The R. was the natural defence of the Rom. Empire against the Teutons (q.v.), who, however, in the 4th cent., swept away the elaborate fortifications which the Romans had raised. With the partition of the Frankish Empire of Charlemagne (843), the R. became a Germanic riv. France, however, through the peace of Westphalia (q.v.), obtained a footing on the l. b. In 1801 the l. b. of the riv. was formally ceded to France, but not till the war of 1870-1 did Germany regain full possession of both banks of the R., and she ceded back herr. b. conquests, Alsace and Lorraine, after the First World War.

The R. was never the scene of any offensive, nor was it even approached by the Allies in the First World War, though after hostilities had ended bridgeheads on the riv. were occupied for some years by Fr., Brit., and Amer. armies (see also under COLOGNE). In the land operations under the command of Gen. Eisenhower on the W. front in the Second World War the R. was the main objective of the Allies. The allied campaign W. of the R. (Feb.-Mar. 1945) was so well planned and fought that the operation of crossing the riv. proved easy, while the advance beyond into the heart of Germany was completed in 5 weeks. See further under RHINE PROVINCE; WESTERN FRONT IN SECOND WORLD WAR.

Rhine, Confederation of the, see CONFEDERATION OF THE RHINE.

Rhine and Marne Canal, system connecting the Rhine and Marne, cut between 1838 and 1853. It is 225 m. long and runs from the Ill at Strasburg to Vitry-le-François, crossing the Meuse, Moselle, and Meurthe R.s.

Rhine Province, Rhineland, or Rhenish Prussia (Ger. *Rheinprovinz, Rheinlande*), former prov. of Prussia (q.v.), bordered

on the W. by the Netherlands, Belgium, and Luxembourg, and on the E. by Westphalia and Hesse-Nassau. It lay on both banks of the Rhine (q.v.), and was composed of 5 governmental dists.: Cologne, Aachen, Düsseldorf, Trier, and Koblenz (qq.v.). The cap. was Koblenz. Its area was 9478 sq. m., and its estimated pop. in 1939 was 8,000,000. After the Second World War, in the 1945 organisation of the new Ger. *Länder*, Cologne, Aachen, and Düsseldorf were incorporated in North Rhine-Westphalia (q.v.), while Trier and Koblenz became part of the Rhineland-Palatinate (q.v.).

The retention of the Rhineland by Germany after her defeat in the First World War was a sore blow to France, and the resurgence of Ger. militarism and aggression between 1932 and 1939 inevitably suggests that unconditional retention was a blunder on the part of the Allies. Lloyd George, however, devoted his efforts after the war to a policy of conciliation designed to give the new Weimar Republic the best possible chance of converting Germany into a pacific and truly democratic country, a problem that again confronted the Allies after 1945. Poincaré (q.v.) from the beginning was completely sceptical of any such policy, and he resented bitterly the fact that the article of the treaty of Versailles (q.v.) which secured the Rhineland for Germany remained infeasible, although the consideration which had induced France to accept the position, viz. the promise of a pact of guarantee by the U.S.A. and Great Britain, was never fulfilled. Poincaré therefore tried, but in vain, to secure by an externally provoked movement of separation from within the Rhineland a reversal of the treaty decision, and his occupation of the Ruhr on the pretext of a failure of coal deliveries was, in the long run, equally fruitless, for his policy, which was really to reduce the potential strength of Germany, was reversed in the Fr. election in 1924. Thus was the stage set for a renewal of the war in 1939.

The industrial tns of the Rhineland suffered heavy air attacks in the Second World War. In Mar. 1943 Essen, with its Krupp works, was first badly hit, and the Möhne, Eder, and Sorpe dams breached. 'Blockbusters' (q.v.) were used with much effect on Essen, Cologne, Düsseldorf, and other places. In the 1945 battle of the Rhine the first of these, and Dortmund, were again especially singled out (see further under the various tns and RUHR).

In the land fighting the Rhineland first figured in the campaigns of the W. front in Sept. 1944, Amer. First Army troops entering Germany in the Trier region on 11 Sept., and in the Aachen area on the 12th, reaching the city of Aachen on 13 Oct. After the fall of Aachen, which was largely ruined, the First Army's offensive operations were curtailed until the Nov. offensives, which were mounted along the entire front. There was fierce fighting to overcome the dams which controlled the flooding of the Roer valley, and while

these remained in Ger. hands progress was retarded; but the Amer. attack on the dams was launched on 13 Dec. Plans for the 1945 campaign envisaged an envelopment of the Ruhr, with the main thrust in the N., the unexpected capture of the Remagen (q.v.) bridge causing some modifications in the overall plan. Cologne was entered on 5 Mar., Bonn fell on 9 Mar., and by the 11th the l. b. of the Rhine was cleared from Koblenz to Andernach, and the stage set for the joint offensive of the Third and Seventh Armies. The Ruhr was enveloped from the bridgeheads at Wesel and Frankfurt. (See WESTERN FRONT IN SECOND WORLD WAR; WORLD WAR, SECOND.)

Rhine-Rhône Canal unites the 2 rivs. after which it is named. It was cut between 1783 and 1834, is nearly 220 m. long, and runs from the Saône, an affluent of the Rhône, to the Ill, near Strasbourg.

Rhineland-Palatinate (Ger. *Rheinland-Pfalz*), Land of W. Germany, bordered on the N. by North Rhine-Westphalia, on the E. by Hessen and Baden-Württemberg, on the S. by France, on the SW. by the Saarland, and on the W. by Luxembourg and Belgium (qq.v.). It comprises parts of the former Prussian provs. of Hesse-Nassau and the Rhine, the former ter. of Hessen on the l. b. of the Rhine, and part of the former Palatinate (qq.v.). The pop. is (1950) 57.7 per cent Rom. Catholic, and 40.7 per cent Protestant. There is a univ. at Mainz, and there is a theological faculty at Trier. Cap. Mainz (q.v.). Area 7665 sq. m. Pop. 3,284,000.

The country is generally high-lying. It is bounded on the E. by the Rhine (q.v.), and is crossed NE.-SW. by the Moselle (q.v.) and the Nahe. In the N. is the Eifel (q.v.). There are many forests, and the riv. valleys are very fertile. Vines are grown over a great part of the Land; the wines of the Rhine and Moselle valleys are famous. The prin. crops are oats, potatoes, rye, wheat, barley, sugar beet, and tobacco. Cattle, pigs, goats, horses, and sheep are raised. There are sev. mineral springs. Manufs. are varied, and include textiles, chemicals (Ludwigshafen), machinery, spirits, leather goods, pottery, and glass. Apart from the cap. the prin. tns are Koblenz, Trier, Worms, Kaiserslautern, Ludwigshafen, Pirmasens, and Speyer (qq.v.). See also RHINE PROVINCE.

Rhinitis, see under NOSE.

Rhinoceros, perissodactyl ungulate, family Rhinocerotidae, of which 5 species still exist, 3 in Asia and 2 in Africa. A number of extinct forms have been identified, including 4 which inhabited Britain. Specimens of the woolly R. have been found embedded in ice; the skin was without folds, and covered with hair and wool. The anterior horn was of remarkable size. The living R.s are, with the exception of the elephant, the largest and most powerful terrestrial mammals. The head is large and the skull elongated, the brain cavity is relatively very small, and R.s are of low intelligence; the senses of

smell and hearing are highly developed. The limbs are moderately long and stout, with 3 toes on each foot. The hide is scantily covered with hair, the face bears 1 or 2 median conical and recurved horns, which are composed of a mass of epidermal hairs. The 2 African R.s are the 'Black' or prehensile-lipped species (*Diceros bicornis*), found mainly in the forests of the mts and the arid bush, and the 'White' or square-mouthed species (*D. sinuatus*), which is a dull brown-black in colour, and, though once common in S. Africa, is now confined to the Sudan, NW. Belgian Congo, Fr. Equatorial Africa, W. Uganda, and Natal. These



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A 'WHITE' RHINOCEROS

species differ from the Asiatic R.s in the absence of folds in the skin and in the lack of incisor teeth in the front of their jaws, fighting when roused solely with their horns, whereas the Asiatic kind attack with their lower tusks. The Asiatic species are *Rhinoceros unicornis* and *R. sondaicus*, both of which are 1-horned, and *Ceratorkhinus sumatrensis*, which is 2-horned and has a smooth skin and ears fringed with long hairs.

Rhinoplasty, plastic operation to replace lost tissue in the nose by tissue from some other part of the patient's body. In the Indian method, long known in the E., and introduced into Europe in 1814, a flap of skin is cut on the forehead, remaining attached to it by a small portion. It is then twisted round, so as to keep the external part outside, and placed over the area of lost tissue. The lower part of the septum is usually formed from the skin of the upper lip. When adhesion has taken place the attachment to the forehead is cut through or trimmed so as to reproduce the shape of a normal nose. In the It. method, devised by Tagliacozzi of Bologna in the middle of the 16th cent., a flap is cut in the patient's arm and the skin moulded to form a nose. The arm must be bound to the face while adhesion is taking place, after which the tissue connecting arm and nose is severed. These methods, broadly speaking, are the same as used by modern plastic surgeons.

Rhinoscopy, visual examination of the interior of the nose. It may be done by concentrating a ray of light from a frontal mirror through the nostrils, or by introducing a small mirror fitted with a long handle by way of the mouth into the naso-pharynx. Fenwick's urethroscopy may also be adapted to R. Examination of the anterior nares is called anterior R.; that of the posterior nares, posterior R.

Rhizomes, see ROOT.

Rhizopoda, or Sarcodina, class of Protozoa in which the prin. stage in the life hist. is amoeboid and in which flagellae are not developed. The processes which flow out from the main body of protozoa are in the form of threads or blunt lobes, these being used in locomotion and the capture of food. R. include Amoeba (q.v.), Foraminifera (q.v.), Radiolaria, and Heliozoa.

Rhodanthe, now botanically known as *Helipterum marginale*, has flowers of the dry and unfading kind called everlasting, roseate or purple in the upper part and silvery below. It is found in W. Australia and has been introduced into Brit. greenhouses as a charming half-hardy ann. 9-12 in. high, with white or pink daisy-like flowers. The R. will grow in the open air in a temp. between 60° and 80° F.

Rhodanus, see RHÔNE.

Rhode Island (Little Rhody), smallest of the United States of N. America, and one of the 6 New England states which formed part of the original 13 states of the Amer. Union. It lies between Massachusetts on the E. and N. and Connecticut on the W., while its S. shores are washed by the Atlantic. The climate is mild and equable. There are no mts in R. I.; the N. and E. portions of the state are hilly and the land slopes to the S.; the highest point is Jerimoth Hill (812 ft), near Connecticut line; other hills are Woonsocket Hill, Mt Hope, Diamond Hill, and Hopkins Hill. The 3 largest rivs. are the Blackstone, Pawtucket, and Pawcatuck. Block Is., a favourite resort, is 10 m. SW. of Point Judith. R. I. has 45 m. of Atlantic coast, and Narragansett Bay affords 350 m. more coast-line. It is the most densely populated state (748 persons per sq. m.), and exceeds all others in its industrial output *per capita* and in its pop. It is over 97 per cent urb. It has c. 265,000 ac. of farm and pasture land. Brown Univ., founded in 1764, has some 5000 students; there are 2 state colleges, and Providence College, founded by the Dominicans (1919), with 2500 students. Manufs., which form the staple industry of the country, consist of cotton, woollen, worsted, and mixed textiles, silk, jewellery, and machinery for the textile trade. There are also dye works. Manufactured goods were valued at over \$614,636,000 in 1950. Providence, Woonsocket, and Pawtucket are the chief sites of the textile trade, which was introduced in the 17th cent. There are some 213 m. of railway and 11 airports.

R. I. was first settled in 1636 by Roger Williams and others who were expelled

from Massachusetts because of their religious opinions. Settlers of every creed were admitted. In 1647 a patent was granted for the government of the settlement, and a charter in 1663. In 1790 the state accepted the federal constitution and entered the union as the thirteenth original state. The General Assembly consists of a Senate of 44 members and a House of Representatives of 100 members, both elected for 2 years, as are also the governor and lieutenant-governor. The state is represented in the national congress by 2 senators and 2 representatives.

The state cap. is Providence (1950, 248,674); other prin. tns are Pawtucket, 81,436; Cranston, 55,060; Woonsocket, 50,210; Warwick, 43,028; Newport, a watering-place, 37,564; E. Providence, 35,871; and Central Falls, 23,550. The pop. of R. I. is 791,896. The foreign-born whites in 1940 numbered 137,800 (19.3 per cent of the total). The Negro pop. was 1.5 per cent. There were over 28,000 Italians, 23,000 Fr. Canadians, 19,000 English, and 11,000 Irish, who are a power in influence in the politics of the little state. See *Book of Rhode Island* (issued by State Bureau of Information, Providence), 1930; C. Carroll, *Rhode Island: Three Centuries of Democracy*, 1932; and Federal Writers' Project, *Rhode Island: A Guide to the Smallest State*, 1937.

Rhode - Saint - Genèse, see SAINT-GENESUS-RODE.

Rhoden, Inner and Outer, see APPKN-ZELL.

Rhodes, Cecil John (1853-1902), statesman, b. Bishop's Stortford and educ. at Bishop's Stortford Grammar School. In 1869 his health broke down, and he went to Natal to join his brother Herbert on a cotton plantation. In 1873 R. returned to England and went to Oriel College, Oxford, but he came down in a few months, his heart and lungs being affected. He did not take his name off the books, but kept terms whenever he could, and took his degree in 1881. He had a love for the classics, and in S. Africa usually had with him a vol. of one of his favourite authors. In Kimberley in 1874, with a partner, Itudd, he had a big holding in the diamond fields, where his prin. rival was Barney Barnato (q.v.). In 1880 R. amalgamated sev. smaller companies into the De Beers Mining Company, and Barnato, working on the same lines, formed the Barnato Mining Company. There was a bitter struggle between these corporations, but in 1889 they were amalgamated under the style of De Beers Consolidated Mines, with R. as chairman. R. was as anxious as Barnato to make money, but his endeavours to possess a vast fortune were dictated not only by commercial motives. He was a man of dreams, which, however, were based upon concrete ideas, and his prin. objective was a federated S. Africa under the Brit. flag. He entered public life in S. Africa in 1881, when he took his seat in the Cape legislature. He gradually obtained the respect and admiration of his

colleagues, and in a few years became, by sheer force of character, one of the dominant spirits. All his efforts were directed towards the extension of Brit. rule and influence, and he was largely responsible for the annexation of Bechuanaland in 1884. In his efforts to secure N. expansion, R. was favoured by the fact that he was virtual dictator, with large powers, of the South African Company, the chartered company, in whose interest in 1890 Dr Jameson estab. himself at Salisbury.



CECIL J. RHODES

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In the same year R. became Prime Minister of the Cape, and the occupancy of those two positions made him the most influential man in the continent. He held office until the famous 'Jameson Raid' compelled his retirement. The select committee of the House of Commons appointed to examine the matter found R. guilty of grave breaches of duty both as Prime Minister of the Cape and as managing director of the chartered company. When the S. African war broke out in 1899, R. at once went to Kimberley, which, shortly after his arrival in Oct., was besieged until the middle of Feb. He died on 26 Mar. 1902, and was buried, according to his instructions, in the Matopo Hills. In 1912 a monument to his memory was erected on the Groote Schuur slopes of Table Mt. R. left a fortune of £6m. sterling. By his will his house Groote Schuur was bequeathed as a residence for ever for the Prime Minister of a federated S. Africa. He instituted scholarships at Oxford of the value of £300 each (the total endowment

being over £50,000 a year) for students of the U.S.A. and the colonies, such students to be elected, not merely for academic attainments, but for general all-round fitness. In his life R. had his detractors, but now his great qualities are almost universally admitted. It was an imperialist of the full post-Franco-Ger. war of 1870 type, when the period of liberal advance in Europe had given place to power politics. He was bent on carving up Africa for Britain's gain and the outwitting of rivals, especially Germany, but he sincerely believed that Brit. rule was best for Africans. In political opinions he was more radical than Conservative. Thus he supported Irish home rule, and wished to see S. Africa become a dominion with the maximum degree of self-government, but a Brit. dominion nevertheless. His career had moulded him. In the struggle for the survival of the fittest at Kimberley he had been engaged in big business; and S. African big business, which made millionaires from nothing in a few years, was not conducted on principles approved by the fastidious. 'Rhodes had no moral recoil from methods which would certainly not have been entertained by a man with a background of official or service life and its standards of conduct' (J. A. Williamson, *Great Britain and the Empire*, 1944). He was, undoubtedly, a visionary, and, by the provisions of his will, he made manifest his hope that one day there would be a union, not necessarily official, between all Eng.-speaking races. See lives by Sir T. E. Fuller, 1910; Sir L. Michell, 1910; A. F. B. Williams, 1921; Sarah G. Millin, 1933; J. G. McDonald, 1934; and H. Baker, 1934.

Rhodes, James Ford (1848-1927), Amer. historian, b. Cleveland, Ohio, and educ. at New York Univ., univ. of Chicago, Collège de France, 1867, and the School of Mines, Berlin. He was engaged in his father's coal and iron business at Cleveland, 1874-85. He then devoted himself to hist., and among his works are *History of the United States from the Compromise of 1850, 1853-1906*, *History of the Civil War*, 1917, *History of the United States from Hayes to McKinley*, 1919, *The McKinley and Roosevelt Administrations*, 1922.

Rhodes, Gk is. of the Levant, lying 12 m. off the coast of Turkey. It is 46 m. in length, with a maximum breadth of 24 m. Area 547 sq. m. Its surface is mountainous, diversified with fertile valleys, producing fruit, especially fine grapes, olives, tobacco, vegetables, and wine. Other products are oil, leather, sesame seed, and sponges. It is a beautiful is., and has been called the Is. of Roses, even though roses scarcely figure among the fine tropical flowers such as the hibiscus and the purple bougainvillea. The is. enjoys an excellent climate, but its once famous harbours have been allowed to decay, and its commercial importance has dwindled. It began, however, to increase in the late 1920's, trade being chiefly with Egypt, Italy, and Turkey. There is an airport, and the tourist trade is of

growing value. Its cap. is R., an archbishop's see and formerly a strong fortress, encircled by triple walls and moats. At the time of Alexander the Great it was 9 m. in circuit, and was considered one of the finest cities in the world. The medieval fortifications were carefully restored by the Italians. At the mouth of R. harbour stood the celebrated 100-ft high Colossus of R., one of the 'seven wonders' of the world (q.v.), an enormous statue of bronze, which was thrown down by an earthquake in 224 B.C. The old city of R. was built by the crusader knights; Mussolini added most of the modern parts. The famous castle of the city of R., which was built by the Knights of St John in the 14th cent., was restored by the Italians in 1937-40. Notable, too, are the ruins of the medieval castle at Lindus, with remains of the ancient acropolis. Of the 50 vills. on It. 1 is Turkish and the other 49 are Gk. The antiquity of the Gk civilisation in R. is evident. The ruins of 3 Bronze Age cities remain, each with its mt citadel overlooking the sea. There is a community of Sp.-speaking Sephardic Jews in R. city. The Turks live mostly in the tn or in market-gardening settlements near by. Pop. (is.) 59,000; (tn) 23,600.

It has had an eventful hist. It was founded by Gk settlers from Argos. It steadily increased in importance, and as early as the 7th cent. B.C. it was carrying on a prosperous trade with Spain, Sicily, and Italy. It came under the sway of the Persians in the 5th cent. B.C. but was wrested from them by Alexander the Great in 334 B.C. It was plundered by Cassius in 43 B.C. for siding with Caesar, and was devastated by an earthquake in A.D. 1551. In medieval times Byzantine rule in R. was challenged by Arab raiders and adventurers. In 1310 the is. was seized by the Knights of St John of Jerusalem, who lost it to the Turks after a famous siege in 1522. In 1912, during the Tripoli war, it was occupied by Italy, and in 1924 it was ceded to that country with other Aegean Is. The Greeks took over the Dodecanese, including R., in April 1947. See C. Torr, *Rhodes in Ancient Times*, 1885, and *Rhodes in Modern Times*, 1887; Baron de Balabre, *Rhodes of the Knights*, 1909.

Rhodesia and Nyasaland, Federation of, came into being following the passing of an Act of the Imperial Parliament in 1953 which set up the constitution under which the Federation operates and which is subject to reviews. The Federation is composed of the self-governing colony of S. Rhodesia and the protectorates of N. Rhodesia and Nyasaland, and is situated in S. Central Africa extending about 1000 m. N. and S. from lat. 22° 30' S. to lat. 8° 16' S. On the S. it is bordered by the Union of S. Africa, on the W. by the Bechuanaland Protectorate and Portuguese W. Africa, on the N. and NW. by the Belgian Congo, on the N. by Tanganyika, and on the E. by Portuguese E. Africa. The F. R. N. islandlocked; Bulawayo (q.v.) in the S. is 1300 m. from Cape

Town; Umtali (q.v.) on the E. border is 200 m. from Beira. There is also a rail connection between Lobito Bay in Portuguese W. Africa and N. Rhodesia. From time to time suggestions are made that a railway route already surveyed to the W. coast in S.W. Africa may come into being. An important attraction is the possibility of exporting coal from Wankie to the U.K.

Communications. There is an excellent internal air service maintained by the gov.-sponsored Central African Airways, which also flies a regular service to S. Africa and to the U.K. There are 4000 m. of main roads and some 8000 m. of secondary roads. The Rhodesia Railways provide connections with the S. African Railways and with the Portuguese E. African Railways, giving the Federation access to ports in S. Africa and Portuguese E. Africa, i.e. Beira and Lourenço Marques. The railways also connect with the Belgian Congo rail system, and so with the Benguela Railway through Angola to Lobito Bay. Total mileage of the Rhodesian Railways (1956) was 2700 m. Major capital works are now being undertaken, and new rolling stock and locomotives are being acquired as fast as deliveries permit. Tonnage hauled increased from 5,200,000 tons in 1949 to over 8,000,000 tons in 1954. The railway system is inadequate to handle satisfactorily the rapid commercial and industrial expansion of the Federation. The Nyasaland Railway system consists of 3 companies which provide a route from Salima near Lake Nyasa to Dondo near Beira, where connection is made with the Beira Railway. The companies are the Nyasaland Railways, their subsidiary company, the Central African Railway, and the Trans-Zambezia Railway.

Telephones and Telegraph services link up the Federation and are operated at a high standard.

Under the constitution, transport and communications are the responsibility of the Federal Gov., not of the separate parts.

Geography. The total area is 485,000 sq. m., i.e. larger than the whole of N. Europe including the Brit. Is., but without Scandinavia, and larger than the Union of S. Africa. The greater part of the country is 3000 ft or more above sea-level, and comprises tree- and bush-covered plains, with large areas of open savannah country. In the E. there is mountainous country rising to between 8000 and 10,000 ft. In the main river valleys and in the plains of Nyasaland conditions are hot and humid, but in the rest of the country climatic conditions are generally pleasant and suitable for white settlement. Over the whole country rainfall is seasonal, and many smaller rivers flow only in the rainy season. There are, however, a number of rivers which flow all the year round. The greatest is the Zambezi, which forms the boundary between N. and S. Rhodesia. The Zambezi, the Kafue, and Shire all have sufficient flow to supply sources of hydroelectric power. Other major rivers which flow all the year round are the Luangwa,

the Chambezi, the Luapula, and the Songwe. There are numerous large lakes in the N. parts of the Federation, and in Nyasaland, where Lake Nyasa forms part of the Great Rift Valley, nearly one-fifth of the total area of the terr., i.e. 12,000 sq. m., is water. In N. Rhodesia Lake Bangweulu and its swamps cover an area of 3800 sq. m., and parts of Lakes Tanganyika and Mweru fall within the Federation. The whole area is within the tropics and S. of the Equator. Practically

who are the responsibility of the territorial govs. In 1956 there were 50,000 European children at school, and approximately 6000 Asians and children of mixed race. The gov. maintains about 200 schools; there are also a number of private schools. In 1956 a teacher-training college for junior school teachers was established in Bulawayo. The Univ. College of Rhodesia and Nyasaland is already able to accept students in the Faculties of Arts, Science, and Education. The univ. is sited at Salisbury. Throughout the Federation 750,000 African children attend schools. The majority of these schools are run by Christian missions which receive gov. financial aid. In the towns the gov. is building schools for Africans which will be entirely secular. There are sev. technical and secondary schools for Africans, but the percentage of children reaching secondary schools is low.

Economic. The economies of the 3 ters. forming the Federation are largely complementary, which was a compelling force towards the establishment of the Federation. Since 1954 statistics of trade have been available on a federal basis. The integration of the economies of the constituent ters. has not yet shown an aggregate increase in trade (1956), and economic development, which is potentially dynamic, is unable to progress at the rate desired because of transport and other difficulties which are being rapidly overcome. The pop. of the Federation is big enough to provide a market for a large proportion of its potential manufacturing capacity, including textiles made from locally grown cotton. The textile industry now covers all phases from the spinning into yarn and the subsequent weaving of the material to the manuf. and export of finished cotton garments. The importance of gold in the export trade has diminished, having given way to base metals such as copper, chrome ore, lead, and zinc. Other major exports are asbestos, lithium ores, tea, tungsten, and tobacco. The external trade amounts to an ann. (1956) trade of £300m., in which exports and imports are practically balanced. The mineral wealth of the Federation greatly outweighs any other of its resources, and prospecting has shown tremendous reserves as yet unexploited. The total value of all minerals produced in the Federation increased from £46.9m. in 1949 to £114.5m. in 1953 and £116.3m. in 1954. By quantity the greatest output was of coal: 3,030,000 tons in 1954, mostly from the Wankie field, although coal exists over wide areas of S. Rhodesia. The Wankie fields are said to contain the largest known reserves in the world, covering 400 sq. m. and estimated to contain over 4,000,000,000 tons. However, the value of the output of copper at £91m. in 1954 exceeds the combined value of all other minerals produced in the Federation. The output of gold, almost entirely restricted to S. Rhodesia, was 535,852 oz. valued at £6,687,005 (1954), and asbestos was valued at over £6m., making the Federation one of the world's largest producers.



Federal Information Department
EASTERN CATARACT, VICTORIA FALLS

all the rain falls during less than half the year, from Nov. to April. The rainfall varies from about 15 in. a year in some of the lower-lying parts of S. Rhodesia to as much as 100 in. a year on Mt. Maranje in Nyasaland. Over most of the European-settled areas the ann. rainfall varies between 25 and 50 in. per annum. In areas lying at an altitude of 4000-5000 ft the average rainfall is 30 in. The winter months from May to Aug. are usually fine and sunny, with frequent heavy frosts during the night at the higher altitudes. Health conditions in most of the Federation are satisfactory for Europeans. The 2 most prevalent tropical diseases are malaria and bilharzia, which infects many rivers, and bathing is not safe on that account. Malaria is virtually restricted to remote areas. Tsetse fly is found, and those areas are virtually uninhabited.

Education is a Federal Gov. responsibility except for African schoolchildren,

History. The hist. of the Federation is largely an extension of the hist. of the 3 constituent ters. Ethnically, moreover, both the African and European stock in all the ters. is similar: sev. interests, such as transport, communications, currency, internal security, and customs, present common problems. Equally, the economies of the 3 ters. are essentially complementary. It can be said, therefore, that when the Federation came about in 1953 it was not a sudden development, but rather a sequel and corollary to what had been in mind for

the sponsors securing 5989 votes for amalgamation as against 8774 for responsible gov.) In 1953 (April) the number of votes on Federation with N. Rhodesia and Nyasaland was 25,570 in favour and 14,729 against. In N. Rhodesia there was no serious opposition to Federation by the European community, although many colonial civil servants were uneasy. By and large, the native pop. was indifferent, but African political leaders were uncompromisingly against Federation on various grounds. They boycotted the important preliminary meetings held



Federal Information Department

ROAN ANTELOPE COPPER MINE

more than 40 years and always an ideal of Cecil Rhodes. S. Rhodesia was impelled towards N. Rhodesia by a number of factors, chiefly the economic advantage of associating more closely with N. Rhodesia, whose buoyant economy rests on immense mineral resources, fortuitously complementary to the economy of S. Rhodesia which, though more diversified, is largely agric. and pastoral. It was argued by S. Rhodesian advocates of Federation that, owing to S. Rhodesia's economic vulnerability, the only alternative to Federation with N. Rhodesia and Nyasaland would ultimately be incorporation with the Union of S. Africa as a prov., an alternative which did, in fact, appeal to a small but vocal minority in S. Rhodesia. (In 1922 amalgamation with S. Africa was the subject of a referendum,

in London during Jan. and April-May 1952 under the joint chairmanship of Lord Salisbury and Mr Oliver Lyttleton (Lord Kennnair).

Two Africans came with the S. Rhodesian delegation and attended the conference at Lancaster House. This conference was made up of 53 experts in colonial affairs and constitutional law. The draft Federal scheme was presented to Parliament on 18 June 1952 and returned to the final conference in Jan. 1953 with an all-important amendment, i.e. insistence on the establishment of an African Affairs Board with the status of a Standing Committee. The avowed purpose of the African Affairs Board is to scrutinise all proposed legislation before the Federal Parliament and use its powers to block any legislation which is

considered by the Board as discriminatory. The insistence by the Imperial Gov. on the creation of the African Affairs Board was deeply resented by the advocates of the Federation as distrust, by implication, of the *bona fides* of the Europeans, as if to suggest that they would betray the African pop. However, the leaders of the Federal movement, Lord Malvern (Sir Godfrey Huggins) and Sir Roy Welensky, declared that in their opinion had they not been prepared to accept this condition insisted upon by the Imperial Parliament, the necessary legislation would not have been passed. Apart from any real or imagined distrust the African leaders may have had of the European motives for desiring Federation, there is no doubt that the politically conscious African minority in N. Rhodesia and Nyasaland saw in Federation the death knell of any prospects of independence or even dominion status on the same lines as projected for the Gold Coast and Nigeria. It is interesting to note that the Paramount Chief of Barotseland, Mwana-wina III, came out into the open for Federation against his fellow chiefs in N. Rhodesia and Nyasaland. In Nyasaland opposition to Federation appeared to be spontaneous, consistent, and general during the latter stages, whereas in the beginning that did not appear to be so. Misguided advice by European missionaries was held partly responsible for riots that occurred with loss of life. Both in N. and S. Rhodesia there was opposition to the inclusion of Nyasaland in the Federation on the grounds that Nyasaland would be a serious financial liability. The arguments advanced for Nyasaland's inclusion were based largely on strategic and political expediency and the fear that an independent Nyasaland might harbour and foster anti-European movements. The inclusion of Nyasaland in the Federation was also a pre-requisite of the Imperial Gov. Nyasaland in fact has benefited from the economic point of view, and social services have improved because of its association with the other territories. Nyasaland's economic destiny is inextricably bound up with and dependent on the prosperity of her neighbours.

An argument against Federation put up by S. Rhodesian opponents was a fear that the 'Black North' would in the distant future be able to dominate a Federal Parliament, by virtue of superior numbers of the electorate, assuming that all adults would eventually obtain the franchise. This argument was unrealistic, because education in the foreseeable future cannot reach the vast mass of the pop., who live in small and scattered communities in remote areas. A more practical and serious objection was that the liberal political policy of the Colonial Office, especially under Labour govts., had been excessive, resulting in an unsettling effect on the Africans in S. Rhodesia. It was feared that close association would stimulate pseudo-democratic ideas and cause political unrest. Pro-Federationists used the same argument to press the point

of view that unless N. Rhodesia came into Federation there might well grow up along the borders of S. Rhodesia a state which could eventually, under a 'Gold Coast' type of gov., cause untold trouble to S. Rhodesia, which was bound to be increasingly integrated with, and dependent economically to some degree on, its neighbour. A further argument for Federation which was canvassed behind the scenes was the genuine apprehension of mass immigration of Indians through Tanganyika and from India direct. The rapidly increasing prosperity of N. Rhodesia was proving an irresistible attraction to Indians. The spectre of the Indian problem in S. Africa on the one hand, and the Indian question in Kenya to the N., haunted Europeans in both Rhodesias. This apprehension applied in no lesser degree in Nyasaland, where the Indian pop. had increased from 1558 in 1935 to approximately 7000 in 1956. Under the Federal Constitution immigration became a Federal matter, so that a halt could be called, if necessary, to excessive Indian immigration, by legislation which Ter. Protectorate Govs. would be unlikely to introduce because of the certainty of overruling in the U.K.

At the time of Federation, and before, dominion status was the aim of S. Rhodesia, which was indeed virtually a dominion in that the Imperial Parliament never exercised its reserve powers, and to have done so would have been considered a breach of an estab. constitutional convention. At Imperial Conferences attended by Dominion Prime Ministers, Lord Malvern, then Sir Godfrey Huggins, was present not of right but rather as a personal compliment and also as indicative of S. Rhodesia's status as a self-governing colony which was substantially the same as that of a dominion. Following the Prime Ministers' Conference held in London in 1956, it was stated that Prime Ministers of the Federation of Rhodesia and Nyasaland would be invited to attend future meetings of Dominion Prime Ministers. In 1955, and much more strongly in 1956, Europeans in the Federation hardened towards demand for early dominion status, the demand becoming stronger as the W. African colonies seemed to be nearing the same goal. The European pop. of the Federation insisted that they were infinitely farther advanced politically and otherwise than other territories which had either attained, or were apparently about to attain, dominion status. Opposition to the immediate grant of dominion status was that it would be regarded as a breach of faith towards the African pop. of the protectorates of N. Rhodesia, Barotseland, and Nyasaland, who would, by the creation of a Central African dominion, probably forfeit whatever might be their protectorate relationship with the metropolitan power and the supposed advantages accruing thereby. In the Federation this argument was regarded somewhat cynically as a matter which was apparently being relegated to the sphere of British party politics instead

of being regarded on its merits and in the light of developments elsewhere in Africa S. of the Sahara. In this connection it was pointed out in the U.K. that the appropriate time to discuss any change in the constitution of the Federation would be when the constitution came up for review, as it is bound to do under the terms setting up the Federation.

The stages and events leading to Federation can be clearly traced from 1923, when the 2 Rhodesias became separate entities, until the question of amalgamation came up again for consideration in 1930. In 1938 a Royal Com-

mission of the unofficial members in the Legislative Council in N. Rhodesia, stated publicly in the U.K. that Colonial Office policy was so inhibitory that if Federation with S. Rhodesia was to be denied, then he would make every effort to encourage European immigration to N. Rhodesia on a large scale until such time as their numbers would justify a demand for dominion status.

Federation was first advanced by the Labour party in the House of Commons, and with the change of gov. the Conservatives brought the plan to fruition.

Great play was made of the term



Federal Information Department

ABERCORN STREET, BULAWAYO

mission was appointed under the chairmanship of Lord Bledisloe to examine all aspects of closer co-ordination of the 3 ters. As a consequence there was established the Central African Council in 1945 that had neither executive nor administrative functions, but which, nevertheless, succeeded in creating common services and extending existing ones. Experience in the operation of the Council demonstrated the limitations of the purely consultative machinery of this body and the necessity for closer working arrangements if the potentialities of the ters. were to be fully exploited. From 1951 onwards, until the formation of the Federation, active steps were taken to arouse interest in the Federal idea, both in official and unofficial circles in the 3 ters. concerned and in the U.K. It was during this stage that Sir Roy Welensky (q.v.), then the leader

'partnership.' The word itself was used only once in the relevant White Paper, and in the event it was shown that 'partnership' was capable of sev. interpretations of degree, and the Africans in the Federal scheme of things were extremely junior partners. The Union of S. Africa and the Federation are closely linked economically, politically, and socially, as well as having common defence problems and to some extent mutual interests in internal security. While some Federal politicians accuse S. Africa of perpetrating the biggest political fraud imaginable in the doctrine of *apartheid* (q.v.), the S. African rejoinder is that 'partnership' is dishonest in conception and impossible of fulfilment, whereas *apartheid* is an honest policy and attempt to solve a great problem.

It is obvious that with the steady

stream of immigrants from S. Africa into the Federation in every sphere of mining, farming, and commerce, augmenting the already considerable S. African pop., there must also be an infiltration of S. African political philosophy. This tendency is said to actuate the recurrent demands by African political leaders, especially in Nyasaland, to be allowed to secede from

the Federation. Political observers believe that it will be sev. years before the great and imaginative plan of the Federation of Rhodesia and Nyasaland can be said to have been successful or otherwise. It is indicative, however, of international confidence in this constitutional and political experiment in Central Africa that the World Bank and other discerning in-

Distribution of Domestic Exports of Merchandise by Countries

<i>Country of destination</i>	<i>£</i>
U.K.	81,520,144
Union of S. Africa	13,754,029
Australia	5,396,709
India	729,694
Nigeria	333,785
Canada	233,642
Other British countries	1,611,597
<i>Total British countries</i>	<i>£103,579,600</i>
U.S.A.	15,557,421
Sweden	5,126,176
Federal German Rep.	4,274,670
Italy	3,464,334
France	1,929,033
Belgian Congo	1,633,802
Denmark	1,175,987
Belgium	1,244,843
Other foreign countries	5,787,868
<i>Total foreign countries</i>	<i>£40,194,131</i>
<i>Total merchandise (domestic products)</i>	<i>143,773,734</i>
Gold bullion, concentrates, etc.	6,548,119
Re-exports	3,061,431
<i>Total all exports, 1954</i>	<i>£153,383,584</i>

Distribution of Imports of Merchandise by Countries

<i>Country of origin</i>	<i>£</i>
U.K.	55,437,424
Union of S. Africa	43,437,698
India	3,288,050
Australia	1,876,910
Canada	1,541,560
Hong Kong	1,087,224
New Zealand	513,331
Other British countries	2,081,931
<i>Total British countries</i>	<i>£109,264,131</i>
U.S.A.	5,688,892
Netherlands W. Indies	2,580,013
Federal German Rep.	1,592,963
Mozambique	1,514,212
Nahrein	1,232,646
Netherlands	854,894
Belgian Congo	744,923
Italy	720,027
Sweden	662,196
Other foreign countries	2,433,828
<i>Total foreign countries</i>	<i>£18,025,594</i>
<i>Total merchandise imported, 1954</i>	<i>£127,289,725</i>

Principal Exports of Produce and Manufactures of the Federation

	Quantity	£
Copper, blister	230,334 tons	44,948,063
Copper, electrolytic	200,026 tons	41,507,674
Tobacco, unmanufactured	132,484,641 lb.	24,816,283
Asbestos, raw	81,172 tons	6,475,182
Tea	17,111,573 lb.	2,750,418
Chrome ore	318,478 tons	2,616,831
Apparel		2,539,823
Zinc, bar and ingot	298,048 centals	1,229,983
Cattle hides	17,362,327 lb.	1,082,385
Cobalt metal	630 tons	983,645
Jute bags	6,662,435	927,278
Meats, fresh, frozen, or chilled	15,996,613 lb.	921,510
Preserved meats, other	3,770,783 lb.	505,957
Cobalt alloy	1,361 tons	875,614
Wood, unmanufactured	860,032 cub. ft.	543,056
Raw cotton	3,426,881 lb.	461,100
Cotton yarns for further manufacture	2,042,506 lb.	451,088
Cotton piece goods	3,879,839 sq. yds	439,332
Ham	1,977,073 lb.	411,436
Gold bullion and concentrates		6,548,419

Trading figures for 1954 are as follows:

F.o.b. value of general imports of merchandise	£127,290,000
F.o.r. value of general exports of merchandise	£146,835,000
F.o.r. value of gold exports	6,548,000
Total value of exports	£153,383,000

Imports of Merchandise

Class and description	£
Animals, agricultural and pastoral products	1,709,317
Foodstuffs	10,253,463
Alcs, spirits, wines, and beverages	1,176,751
Spirits, non-potable	142,228
Tobacco	79,442
Fibres, yarns, textiles, etc.	24,577,432
Metals, and manufactures of	53,046,013
Minerals, earthenware, glassware, etc.	3,491,744
Oils, waxes, resins, paints, etc.	7,678,270
Drugs, chemicals, etc.	4,489,891
Leather, rubber, and articles of	4,765,634
Wood, cane, and articles of	4,083,687
Books, paper, and stationery	3,475,537
Jewellery, timepieces, fancy goods, and musical instruments	2,010,315
Miscellaneous	6,309,001

Total merchandise, 1954 £127,289,725

vestors exhibit no tendency to withhold investments of immense sums of money.

Constitution. The basis of the Federation is that the protectorates of N. Rhodesia, Barotseland, and Nyasaland retain their same constitutional status except for certain matters, i.e. defence, external affairs, transport and communications, immigration, customs and excise, currency, health, education, except the education of Africans in primary and secondary stages. There are constitutional safeguards for the protection of African interests (see African Affairs Board above). The status of S. Rhodesia as a self-governing colony is not curtailed in any way. The legislative body in the Federal Parliament consists of 59 members including 8 Africans from N. R. and Nyasaland. Also 4 Africans are specially elected, plus 3 Europeans, 2 of whom are nominated and 1 elected, to represent

African interests. The Sovereign is represented in the Federation by the Governor-General, in whom is vested executive power and who is empowered to appoint a Prime Minister and Ministers in accordance with normal British constitutional practice. Except in a few instances where the Governor-General acts at his discretion, he must act in accordance with the advice of his Ministers, as does a constitutional monarch.

Defence. In 1956 the Prime Minister, Lord Malvern, who was also Minister for Defence, announced widespread reorganisation in the light of modern strategic requirements and the role likely to fall to Federation troops. In addition to possible use overseas, the armed forces are so organised as to be able to be used in any part of the Federation for internal purposes. Emphasis is on mobility. The Royal Rhodesian Air Force operates

fighter-bombers (jets) and also has a transport squadron. The regular defence formations consist of 4 infantry battalions: the Rhodesian African Rifles and the Northern Rhodesia Regiment and 2 battalions of the King's African Rifles raised in Nyasaland. There is a Territorial Force consisting of infantry, armoured-car, artillery, and ancillary units. There is initially 10 weeks' continuous training for recruits, followed by part-time service in Territorial units in the 3 following years. Young men between the ages of 17 and 30 are at present (1956) required to register for training, but so far only those up to 23 years of age have been called up.

The population of the Federation (June 1954) was estimated at 6,876,600, of which 220,200 were Europeans, 26,400 Asiatic, and 6,630,000 were Africans.

Rhodesia, Northern, Brit. protectorate, an integral part of the Federation of Rhodesia and Nyasaland (q.v.), separated from S. Rhodesia by the Zambezi R., and bounded on the S. by Bechuanaland and Portuguese E. Africa. Nyasaland bounds it on the E., Tanganyika Ter. and the Belgian Congo on the N., and Portuguese W. Africa on the W. It is watered by the Zambezi, Kafue, Luangwa, Chambezi, and other rivers. It mostly consists of high tableland, thinly forested, only the valleys of the Kafue, Luangwa, and lower Zambezi being below 4000 ft in altitude; while the Tanganyika plateau in the NE. is 5000 ft in height, and in the N. part of Kasempa in the NW. 6000 ft is reached. Lake Bangweulu is entirely in the ter., and Lakes Mweru and Tanganyika lie on its N. boundary. There are wide areas of good arable and pasture land, though the tsetse fly makes farming almost impossible in large areas of Kasempa, and makes transport a problem in the NE. The Kafue valley is the best farming area, with centres at Mayabuka and Lusaka. Maize, tobacco, coffee, wheat, cotton, oil-seeds, and citrus and other fruits are grown, and cattle and pigs are reared. Mining is carried on at Broken Hill, Kitwe, Luanshya, Mufulla, and Chingola. In 1946, 144,000 tons of blister copper were produced and 60,000 tons of electrolytic copper. The ann. production from 6 mines should reach 500,000 tons by 1958. Cobalt, asbestos, chrome ore, lead, and zinc are also mined (see RHODESIA AND NYASALAND, FEDERATION OF). Uranium exists. Mineral exploitation has brought labour problems in its train and led to unrest in the 'copper belt,' but welfare measures, education, and improved wage conditions, together with the development of trade unions, are bringing about a more settled state of affairs. The chief exports are copper, cobalt, vanadium, zinc, tobacco, hides and skins, and gold. The Rhodesian Railway traverses the ter. from Livingstone on the Zambezi in the S. to the Belgian Congo in the N., passing through the tus of Kalomo, Mayabuka, Lusaka, and Broken Hill; Fort Jameson, near the E. frontier,

Abercorn, on Lake Tanganyika, Fort Rosebery, W. of Lake Bangweulu, and Lealui, on the upper Zambezi, are other important tus. Livingstone was the cap. until 1935, when the administration was transferred to Lusaka, 30 m. N. of the Kafue R.

The ter., until 1911 2 provs., NE. and NW. Rhodesia, was governed by an administrator under the Brit. S. Africa Company until 1924, when it was taken over by the Crown and a protectorate estab. A governor was then appointed, assisted by executive and legislative councils. For administrative purposes the ter. was formerly divided into 9 provs., each of which was under a prov. commissioner responsible for his prov. to the governor. The provs. were grouped together under 5 prov. commissioners in 1933 and the number of provs. reduced to 5, but the number has since been increased to 6. The provs. are divided into dists. under the charge of dist. commissioners responsible to the prov. commissioners. Barotseland in the W. is an independent protectorate, though under the administration of the N. R. Gov. Area 287,640 sq. m. The European pop. at the 1946 census was 21,800, and the estimated African pop. 1,541,700. The legislature has wide powers, but provision regarding natives is in the hands of the governor. The large native pop. is given special protection, and local administration is, as far as possible, in the hands of their own chiefs and headmen, who function as native authorities in the courts.

On the early hist. or even late hist. of N. R. there exists little but travellers' tales, and these less than a century and a half old. The first authentic hist. of what is now NE. Rhodesia is taken from the diaries of Dr Lacerda, Portuguese governor of Sena, who led an abortive expedition to Lake Mweru (1798), where he died, leaving his diaries to be brought back by Father Pinto. In the early 19th cent. Portuguese traders brought back stories of a great interior kingdom of the Lunda people, extending from Lake Mweru to Barotseland (q.v.), and including all the country drained by the upper Congo. Very few historical facts are known concerning it. The first expedition of any geographical value was Livingstone's famous missionary journey of 1851 during which he discovered the Victoria Falls. Later explorers, who related stories of native barbarism and large herds of game, were Serna Pinto, Cameron, Solous, and Arnot. The great majority of the present native pop. is of Bantu origin and descended from invaders who swept over the country about AD 1700 or somewhat later. The story of these invasions is lost in tradition, but their traces remain in the great number and diversity of races and languages in N. R. The pop. of N. R. has been classified into some 70 or more different tribes, the most important being the Bemba and the Ngoni in the NE. dists., and there are about 30 different

dialects in use, but many of these vary very slightly. Nyanja is in use as the official language of the police. The chief invaders of the early 19th cent. were the Arabs from the N., the Ngoni Zulus fleeing from Chaka, and the Kololo, who fought their way from the S. across the Zambezi and founded a kingdom which was distinguished by a comparatively high degree of social organisation. One of the more successful of the invading tribes was the Lozi under Lewanika (q.v.), who asked for and obtained the protection of the Brit. Gov. in 1891. In 1900 the chartered company acquired certain trading and mining rights over Lewanika's dominion in consideration of an ann. subsidy and other advantages. During this time the slave trade estab. by the Arabs continued unchecked, and its influence spread from Lakes Nyasa and Tanganyika over the whole of N. R., but with the final estab. of the administration of the Brit. S. Africa Company the slave traders quickly disappeared from the country. The status of the conquered tribes under Lewanika's dominion was that of a mild form of slavery; this social serfdom was ended by Lewanika himself, who in 1906 agreed to the emancipation of the slave tribes.

Before 1899-1900 the whole ter. had been vaguely included in the charter granted to the Brit. S. Africa Company, but in 1899 and 1900 orders in council put the company's administration of the W. and the NE. portions of the country, respectively, on a firm basis. These 2 ters. were amalgamated in 1911 under the designation of N. R. In 1953, following a referendum in S. R., an Imperial Act of Federation created the Federation of Rhodesia and Nyasaland (q.v.). In conformity with treaty obligations the natives were consulted as far as practicable before the Federation was approved. There was no organised opposition of consequence, and as far as the vast majority of natives were concerned no interest was shown. Opposition to Federation was largely based on the belief that without it eventual dominion status might have been attained as in the case of the Gold Coast (Ghana).

Defence. The forerunner of the present N. R. Regiment was an Indian police force raised and equipped on behalf of the Brit. S. Africa Company in 1891, and for some time afterwards the mainstay of the force were Sikhs. Later still, native recruits were enlisted from the Batoka, Baila, and Barotse tribes with N.C.O.s and officers from the Brit. S. Africa police, the official force of the chartered company. During the First World War the military section of the police was mobilised and took part in campaigns until 1919. In 1933 the military section of the N. R. police became the N. R. Regiment. Despite this re-organisation the force remained under the N. R. Police Ordinance, and the appointment of personnel remained the responsibility of the Colonial Office. In 1937, however, it was decided to model the N. R. Regiment on the

pattern of other African forces, and as a result the N. R. Regiment Ordinance was passed, with the prin. effect that European personnel were seconded to the regiment from the regular army. In 1938 the N. R. Regiment European Reserve was formed, and later an African Reserve was formed. On the outbreak of the Second World War the 1st Battalion served in Brit. Somaliland and later in the Far E.; the 3rd Battalion served in E. Africa, Madagascar, and Burma. Defence is now a Federal responsibility (see RHODESIA AND NYASALAND, FEDERATION OF).

See C. Gouldsbury and H. Sheane, *Great Plateau of Northern Rhodesia*, 1911; H. M. Hole, *The Making of Rhodesia*, 1926; W. J. Gale, *One Man's Vision: the Story of Rhodesia*, 1935; T. G. Standing, *The Story of Rhodesia*, 1936; *Labour Conditions in Northern Rhodesia* (report), by G. St. J. Orde Browne, 1938; Lord Harley, *An African Survey*, 1938; *Rhodesia-Nyasaland Royal Commission Report* (H.M.S.O.), 1939; *Northern Rhodesia Official Handbook*, 1948; *Northern Rhodesia: Report, 1946: Report, 1947* (H.M.S.O.), 1948.

Rhodesia, Southern, Brit. self-governing colony in S. Africa, one of the 3 ters. forming the Federation of Rhodesia and Nyasaland. It lies between the Limpopo R., separating it from the Transvaal on the S., and the Zambezi, separating it from N. Rhodesia on the N.; Portuguese E. Africa and Bechuanaland bound it on the E. and W. It is composed of the 2 provs. of Matabeleland and Mashonaland. Of its total area of 150,333 sq. m., nearly 100,000 sq. m. have an altitude of over 3000 ft. and about 26,000 sq. m. of over 4000 ft. the highest land stretching from the NE. to the SW. The lowest areas are in the valleys of the Sabi, Lundi, and Limpopo Rs. near the SE. frontier. These 3 rivs., with their numerous tribs., water the S. part of the country, the N. being watered by the Zambezi and its tribs. There is much excellent pasture land, cattle, sheep, and pigs being reared, and dairy-farming carried on; wide areas are under crops, of which the chief are maize, tobacco, groundnuts, fodders, and fruit of all kinds, citrus fruit predominating. The mineral resources of S. R. are extensive, gold being of first importance, the output being valued at £6,687,005 in 1954; asbestos, chrome ore, coal, silver, mica, lead, and copper are also mined. The mineral rights of the Brit. S. Africa Company in S. R. were purchased by the gov. in 1933 for £2m. Other industries include brick and tile works, iron and brass foundries, the production of cigarettes and tobacco, soap and candles, bacon, and mineral waters, creameries, cotton ginneries, cement works, etc., and electric light and power works. The chief exports of local origin (in addition to gold) are asbestos, tobacco (£17,395,000 in 1953), chrome ore, coal, maize, fresh and preserved meat, hides, and citrus fruit. Communications are good, the total railway mileage being 2700. The Rhodesia Railways are linked with the S. African Railways at Vryburg and run

northwards to Bulawayo, dividing there for Salisbury and the Mozambique port of Beira, on the one hand, and for Livingstone, Lusaka, and the Belgian Congo railways on the other. The Zambezi is crossed near Livingstone by the famous Victoria Falls Bridge. The railway is controlled by a board representing S. and N. Rhodesia and the Bechuanaland Protectorate. The line connects with the Lourenço Marques system of the Mozambique railways, which will give the Federation easy access to that port and lessen its dependence on Beira. Salisbury is the cap., and Bulawayo comes

Company in 1914 the only alternative to renewal seemed to be incorporation in the Union of S. Africa, but in 1922 a referendum resulted in a majority for independence, since when it has been accepted that the future of S. Rhodesia is more appropriately bound up with that of the areas to the N. of it. S. R. was formally annexed to the Brit. Crown in 1923, and the new constitution of that year creating responsible government came into force in 1924. The difference between S. R. and those ter. which can claim to have full dominion status (q.v.) lies in this: that while the former has an executive



High Commissioner for Southern Rhodesia

A NATIVE KRAAL IN SOUTHERN RHODESIA

next in importance; other centres are Umtali, Gwelo (a railroad junction), Gatooma, Que Que, Wankie (a coal-mining tn in the N.), Fort Victoria, Selukwe, Shabani, and Bindura. The Wankie coalfields are said to contain the largest reserves of coal in the world. It has been suggested that by building a railway to the W. coast coal could be exported to the U.K. at an economic price.

Before Federation S. R. stood politically in a position intermediate between that of a dominion subject to no external control and a crown colony in which the legislature is responsible to the imperial gov. The aim of Cecil Rhodes was the early estab. of responsible gov., but the constitution granted by order in council of 1898 provided for a legislature with only a minority of elected members, and expressly reserved control over native affairs to the Imperial Gov. On the expiry of the charter of the Brit. S. Africa

gov. responsible to its elected legislature (formerly the Legislative Assembly, but since 1933 called Parliament), certain specified classes of its legislative acts are still subject, under the instructions issued to the governor, to reservation for the pleasure of the Crown, and to disallowance by it. Further, certain executive acts, relating chiefly to the conduct of native affairs, are subject to the assent of the Crown. The Crown in this case acts on the advice, not of the S. Rhodesian Cabinet, but on that of ministers in the U.K. A peculiarity of the constitution was that the supervision of the Imperial Gov. over native affairs was exercised through the High Commissioner for S. Africa, and native lands were vested in him; but by an amendment of 1937 the High Commissioner relinquished these supervisory powers and the trusteeship of the native reserves. Of these powers the more important are now exercised by the secretary of state, while the trustee-

ship of the reserves is vested in a board of trustees composed of a chairman nominated by the secretary of state, the chief justice, and the chief native commissioner. In 1934 the Parliament of S. R. passed a resolution urging the grant of full responsible government to the colony, though it was agreed that the demand for full dominion status, involving control of foreign relations, was premature. In the result a draft constitution embodying certain amendments (such as those relating to native affairs noticed above) received the royal assent as an Act of the S. Rhodesian Parliament in Oct. 1937. Under the constitution a native council may be estab. in any native reserve representative of the local chiefs and native residents, to advise the governor and manage such local affairs as may be entrusted to it, and in 1937 an Act was passed for the estab. of such councils. The legislature may amend by a two-thirds vote the letters patent setting up the constitution, with certain exceptions (relating to reservation of Bills by the governor and native administration). Under the electoral law of 1937 the franchise was extended to all Brit. subjects not under 21 years of age, subject to certain qualifications of occupancy or ownership of property which, in effect, exclude most of the native pop. S. R., having achieved responsible government, has its own cabinet of ministers, who are responsible to a freely elected legislature. Legislation affecting the enormous native pop. is also subject, as we have seen, to some measure of supervision by the home gov. However, even before Federation it could be said that any interference by the Imperial Gov. was unthinkable and these various residuary powers virtually theoretical, but in practice this control is conditioned by the fact that the financial implementation lies with the local legislature. It is of interest to recall that in 1947 King George VI, on his return from S. Africa, opened the S. Rhodesian Parliament (7 April), when he announced that a defence council was to be estab., to enable the colony to co-ordinate plans with the U.K. and adjoining Brit. ter. Since the grant of responsible government, S. R. has made great progress. Considerable expansion has taken place in agric. and mining production, a large volume of immigration has been absorbed, and the railway system has been widely extended.

There is a high court composed of a chief justice and 3 judges, with criminal and civil jurisdiction. Single judges are stationed at Salisbury and Bulawayo, and twice a year sessions are held at sev. of the other prin. tns. There are also a number of prin. courts of magistrates, assistant magistrates' courts, and sev. periodical courts. Native commissioners have jurisdiction in civil and criminal matters in which natives only are concerned. A joint court of appeal for S. and N. Rhodesia was estab. in 1939. Appeals from the Rhodesian courts to Bloemfontein ceased after the creation of an appeal court for the Federation. In 1954

there were 19 gov. high schools which provided secondary education for Europeans. In addition, there were 100 gov. European primary schools. There are also church and private schools. Education in 1947 was provided for in 100 schools for European children, 15 for coloured, and 2028 for native. The pop. in 1946 was estimated at 1,764,000, comprising 82,400 Europeans, 7500 Asiatic and coloured, and 1,674,000 native. Immigration increased greatly after the end of the Second World War.

The early hist. of the country has given rise to much conjecture, for ruins of at least 500 anct. buildings of unknown origin have been found. The earliest are the most skilfully constructed, but by whom they were built and when (except that it was before the 6th cent. AD) is unknown. The finest ruin is at Zimabwe; there are others at Inyanga, Lundi R., and Khami. The origin of these ruins is still a matter of conjecture. During succeeding cents. Arabian traders kept up communication with Mashonaland, but the country was little known to Europeans until the late 19th cent., though the Portuguese, ever since their occupation of the coast, had exported gold from its mines. In 1837 the pastoral Mashona tribe was conquered by the disciplined armies of the Matabele, a branch of the Zulu Kaffirs, who estab. here a military despotism. In 1889 the Brit. S. Africa Company obtained a charter and, largely owing to the energy of Cecil Rhodes, annexed Mashonaland; the turbulent Matabele were conquered in 1893, and in 1896 the country was formally given its name of Rhodesia, after Rhodes. (For the hist. see also under MASHONALAND; MATABELELAND; RHODESIA, NORTHERN.)

It was in 1911, as stated in the article on N. Rhodesia, that the ter. under the Brit. S. Africa Company's rule was divided into N. and S. Rhodesia. Later there grew up a movement for the amalgamation of the Rhodesias and Nyasaland into a Rhodesian or Central African dominion. The Bledisloe Commission, however, which reported in 1939, did not favour amalgamation within any definite period, though it recommended closer collaboration through an interterritorial council, and suggested that the Imperial Gov. might accept the principle that identity of interests would lead ultimately to political union. In the meantime the report recommended amalgamation of N. Rhodesia and Nyasaland, and contemplated the eventual inclusion within S. R. of the N. portion of Bechuanaland. (For the movement for the amalgamation of S. R. and N. R. as a dominion of the Commonwealth, see under NORTHERN RHODESIA.) The federation of these ter. took place in 1953 following an Imperial Act of Parliament (see RHODESIA AND NYASALAND, FEDERATION OF).

Defence. S. R. has produced many units during the various wars over the past half-century. In 1899, with the outbreak of the S. African war and the departure from the ter. of most of the male

pop. to enlist in the home forces, it was decided to raise a Rhodesian Field Force for the protection of the ter. The chartered company (Brit. S. Africa Company) organised the enlistment of the force, and the home gov. paid for its cost. More than 2000 of the 6000 men enlisted were recruited from Australia, New Zealand, and Tasmania. This force played a notable part in the relief of Mafeking. At the outbreak of the First World War the 1st Rhodesia Regiment was formed. It took an effective part in the SW. African campaign against the Germans. In the following year the 2nd Rhodesia Regiment was formed, and fought in the E. African campaigns. In 1916 the 1st Rhodesia Native Regiment was formed; many of the askari were Matabele, the officers and N.C.O.s being recruited from the Native Affairs Dept and from the Brit. S. African Police. The S. R. Column also came into being and operated in the ter. to the N. of the present N. Rhodesia. S. R. had 11,000 males between 15 and 44, and of these 6329 served in the armed forces during the period 1914-19. On the outbreak of the Second World War a large number of men from S. R. were enlisted for service with the King's African Rifles (q.v.) and the Royal W. African Frontier Force. They served as officers and N.C.O.s in these forces, and saw action in the E. African, Madagascar, and Burma campaigns. More than 1000 S. Rhodesians served in artillery units, forming first the S. R. Light Battery, and later the S. R. Anti-Tank Battery, and in these and other units they saw service in N. Africa, Sicily, and Italy. Defence now being a federal matter, see under RHODESIA AND NYASALAND, FEDERATION OF.

See P. H. Hone, *Southern Rhodesia*, 1909; H. M. Hole, *The Making of Rhodesia*, 1926; A. Macmillan (ed.), *Rhodesia and Eastern Africa*, 1931; T. G. Standing, *The Story of Rhodesia*, 1936; R. Moffat, *Matabele Journals*, 1943; G. S. and E. Moffat, *Matabele Mission*, 1945; and Bishop Knight-Bruce's diary, *Gold and the Gospel in Mashonaland*, 1888 (ed. by Constance K. Fripp and V. W. Hillier), 1949; H. Maclear Bate, *Report from the Rhodesias*, 1953. See also *Annual Departmental Reports of the Government of Southern Rhodesia*; *Annual Year Book and Guide of the Rhodesias and Nyasaland*; *Official Year Book of the South Rhodesian Government*.

'Rhodesia Herald,' daily newspaper pub. from Salisbury, cap. of S. Rhodesia. Estab. 1891, it has the second largest circulation of any Rhodesian newspaper. It follows the trends of the times and wields a strong influence throughout the Federation of Rhodesia and Nyasaland.

Rhodesian Regiments, see *Defence in RHODESIA, NORTHERN, and RHODESIA, SOUTHERN*.

Rhodigium, see ROVIGO.

Rhodium (symbol Rh., atomic number 45, atomic weight 102.9), metal of the platinum group, in whose ores it is found. It was discovered by Wollaston in 1804, and is a very hard white metal, ductile

and malleable (sp. gr. 12.1; melting point 1907° C.). It is insoluble in acids, but alloyed with platinum and some other metals it dissolves in *aqua regia*. Its name is derived from the red colour of its salt solutions, which are prepared from Rh_2O_3 . Three oxides, a chloride, and 2 sulphides have been isolated. It is used, alloyed with platinum, for thermoelectric functions of some pyrometers, and electro-deposited R. has a high reflective power.

Rhododendron (Gk *rhodon*, rose; *dendron*, tree), genus of evergreen and deciduous shrubs or low trees (family Ericaceae) with leathery leaves and racemose corymbs of fragrant flowers, which are of a great variety of delicate tints, and are borne in late spring. A large proportion are hardy, thriving best in a deep fibrous sandy peat. The presence of lime in soils is always harmful to R.s. A mulch of decayed manure is desirable in May, and the seed-pods should be removed as the flowers fade. R.s are increased from cuttings, by grafting in Mar., and by layering in Sept. The R. includes the Azalea, and the cultural requirements are similar. The earliest record of the cultivation of R.s in Britain is 1629, and they became popular after the discoveries made in the E. Himalayas by Sir Joseph Hooker in the mid-19th cent. The genus evolved in the N. hemisphere, but its place of origin is uncertain.

Rhodope, dept of Greece in W. Thrace on the E. foothills of the R. Mts. The cap. is Komotini. Area 1670 sq. m. Pop. 108,000.

Rhodope Mountains (called by the Turks *Dospad Dag* and by the Bulgarians *Despoto Dag*), mt chain dividing Bulgaria and Thrace. Among the inhab. are Vlachs and Bulgarian Moslems, or Pomaks. The chief peaks are Musala (9615 ft) and Rila Dag (8790 ft).

Rhodopis (fl. c. 600 BC), famous courtesan of ancient Greece. Charaxius, Sappho's brother, saw her in Naucratis (Egypt), where she was living with Xanthos, her master; he fell desperately in love with her, and, to his sister's indignation, paid a great price to free her from slavery.

Rhondda, David Alfred Thomas, first Viscount (1856-1918), merchant and politician, b. Aberdare, Glamorgan. Became head of the Cambrian combine and other S. Wales colliery companies. Elected Liberal M.P. for Merthyr, 1888-1910, and for Cardiff, 1910. President of the Local Gov. Board, 1916-17, and food controller in 1917. Raised to the peerage 1916; viscount, 1918. His title passed to his daughter, Margaret Haig (b. 1883), who occupied some of his positions, and became known as an advocate of women's rights.

Rhondda, Margaret Haig, second Viscountess of Llanwerne (1883-), feminist and editor, b. London, and educ. at St Leonard's School and Somerville College, Oxford. She founded and became editor of the non-party weekly review *Time and Tide* (q.v.). Lady R. was a leading figure in the campaign for women's rights. She succeeded to her father's peerage in 1918 by special remainder. Her pubs. include

Leisured Women, 1928, *This was My World* (autobiographical), 1933, and *Notes on the Way*, 1937.

Rhondda: 1. Urb. dist. of Glamorgan, on the S. Wales coalfield, 16 m. from Cardiff. The chief industry is coal mining, but there is also a variety of manufs., such as electrical accessories, light engineering, etc. It sends 2 members to Parliament. Pop. 109,000.

2. Riv. of S. Wales, joining the r. b. of the Taff near Pontypridd. Its valley is an important coal-mining area.

Rhône (Lat. *Rhodanus*), great riv. of Europe (505 m. long), with a drainage area of 38,000 sq. m. The valley is highly cultivated; vegetables, vines, and mulberry-trees and olives in the S. are grown. Rising at an elevation of close on 6000 ft from the lt. Glacier (q.v.) in the Swiss canton of the Valais, it is a turbulent mt torrent until it reaches Brig. At Martigny it changes its course from SW. to NW., and finally reaches Geneva, after traversing the whole length of the lake (45 m.), from Villeneuve, the E. extremity. So far the riv. has fallen 4679 ft (in 106 m.); from Geneva to Lyons (124 m.) the fall is only 689 ft. This second section is marked by numerous narrow gorges as the waters wind about the S. spurs of the Jura Mts. Above Lyons the chief trib. is the Ain, whilst just below is the confluence with the Saône, through which there is a communication with the Rhine, Moselle, Seine, and Loire. The third section (southward from Lyons to the Mediterranean, near Marseilles), with its tribs. the Isère, Drôme, and Durance (on the left), and the Ardèche (on the right), drains valleys where flourished famous centres of Gk and Rom. culture. Here along the r. b. stand to-day the cities of Vienne and Avignon, Tarascon and Arles. The R. is navigable as far as Lyons. The great hydro-electric, navigation, and irrigation scheme of the Compagnie Nationale du Rhône, delayed by the Second World War, will provide a chain of 21 power stations (at Génissiat, Seyssel, Donzère-Mondragon, etc.).

Rhône, dept in E. central France, formed of a part of the ant. prov. of Lyonnais (q.v.), and including part of Beaujolais (q.v.). It is drained by the R. and its tribs. the Saône, Azergues, and Gier. Moderate crops of cereals grow on the rocky soil, and potatoes are produced. The dept is renowned for its wines (Jullénas, Côte-Rôtie, Moulin-à-Vent, etc.). There are important metallurgical, chemical, and textile industries around Lyon. The prin. tns are Lyon (the cap.) and Villefranche (qq.v.). Area 1,104 sq. m. Pop. 966,800.

Rhône Glacier, in the canton of Valais, 31 m. from Brig, in Switzerland. It is the source of the Rhône, and ascends with magnificent ice terraces for 6 m. between the Galenstock, Rhônestock, and Damastock to the E., and the Gerstenhörner and Gelmerhörner to the W. Since the middle of the last century the R. G. has continually receded.

Rhône Wines. There are 3 great wine dists. in the Rhône valley between Lyons and Avignon. At Condrien, 30 m. S. of Lyons, the vineyards of Côte-Rôtie produce the finest and most delicate of R. W. It owes its perfume and delicacy to the *vioignier* vine, grown in the proportion of about 1 to 4 with the black-grape-bearing *serine*, which gives strength and body. The white *vioignier* grape in isolation produces in Château Grillet the rarest and perhaps the finest of all dry white wines. Some 50 m. farther down the riv. the vineyards of Hermitage rise on a steep hill above Tain. Here the great Rhône grape the *syrah*, called at Côte-Rôtie the *serine*, gives what is perhaps the most magnificent of all red wines, in its old age unsurpassed for richness of flavour. White Hermitage pressed from *marsanne* and *rousanne* grapes may lack the fineness and perfume of Château Grillet, but it lives to a wonderful old age and counts among the great white wines of the world. A hundred m. farther S. Châteauneuf-du-Pape near Avignon is famous for the strongest red wines grown in France, which owe their remarkable flavour to the unique vineyard soil. A layer of flat, round stones covers the clay, which holds the moisture, and the grapes are ripened by the fierce heat reflected from the sun-baked surface. On the other bank of the riv. Tavel grows the best and most famous of all *vins rosés*. See H. Warner Allen, *Natural Red Wines*, 1951; A. Lichine, *Wines of France*, 1952; A. Muir, *How to Choose and Enjoy Wine*, 1953.

Rhubarb (*Rheum raphaniticum*), perennial herbaceous plant (family Polygonaceae), is cultivated for its edible leaf stalks, which are utilised as a spring fruit. It will grow in soil that has been deeply dug and manured, but is most productive in a rich deep loam which is well drained. It can be raised from seeds, but stalks should not be gathered until the stools are 3 years old. It is more commonly propagated by div. of the roots. R. is easily forced by covering the 'stools' with inverted tubs, surrounded with litter. The lt. of pharmacy is derived from *R. palmatum*, and is prepared as an extract, infusion, tincture, or pill.

Rhuddlan, tn of Flintshire, Wales, 3 m. S. of Rhyl. The ruined castle, much visited, is 11th cent. R.'s prosperity as a seaport was destroyed by the encroachment of sand. Pop. 2200.

Rhus, commonly known as Sumach, Sumac, or Shumack, family Anacardiaceae, genus of shrubs or trees, mostly poisonous, of temperate regions. Leaves of *R. coriaria* provide a tanning and dyeing material; wood of *R. cotinus*, the Smoke Tree, provides the dye 'young fustic'; the bark of *R. verniciflua*, the Lacquer Tree, yields the Jap. lacquer; *R. succedanea* has fruits yielding wax. *R. toxicodendron*, the Poison Oak, *R. radicans*, the Poison Ivy, and *R. vernis*, the Poison Elder or Sumach, are Amer. species with highly poisonous sap and toxic to the touch. *R. cotinoides*, *R. copallina*, and *R. typhina*, the Staghorn

Sumach, are popular garden shrubs for autumn foliage colour.

Rhussen, see **SEICHE**.

Rhyl, popular seaside resort, 30 m. NW. of Chester, near the mouth of the Clwyd, in Flintshire, N. Wales. Pop. 18,500.

Rhyme, or **Rime** (spelling and etymology have been disputed, but according to the *Oxford English Dictionary* 'rhyme,' 'rime,' and 'rhythm' all come from Gk *rhuthmos*, rhythm). In medieval Lat. *rithmi* meant accentual as distinct from quantitative verse. Accentual verse was usually rhymed, so *rithmus* came to mean R. In the 16th cent. on classical models the spelling 'rhyme' was adopted. The spelling 'rime' is due to a false derivation from O.E. *rim*, number. R. is the arrangement of word-endings—identical in vowel and following consonant or consonants but not having the same consonant before the vowel—at the conclusion of 2 or more lines. R.s in which the final syllable is accented are known as masculine R.s, e.g. 'name,' 'fame'; those in which the final syllable is unaccented are termed feminine, e.g. 'scattered,' 'shattered.' Another name for the feminine R. is double R.; both it and treble R. are common in comic poetry, e.g. 'blossom,' 'opossum' in Calverley; 'Sunderland,' 'Blunderland' in Pope. R. was not used by the Gk or Rom. poets, and cannot be traced farther back among the European nations than the troubadours of Provence, the minnesingers of Germany, and the monks who, after the fall of the Rom. Empire, added rhyming terminations to the Lat. metres which were chanted or sung in the church service. O.E. poetry does not use R., but it is common in M.E. See T. W. Rankin, *Rhyme and Reason*, 1929.

Rhyming Poem, O.E. poem of 87 lines, preserved in the Exeter Book. It probably belongs to the 10th cent., and is the only surviving example from this period of the use of end-rhyme and alliteration together in one piece. It seems to be rather a metrical exercise than a poem. See W. S. Mackie, 'The Old English Rhymed Poem,' in *Journal of English and German Philology*, 1922, with trans.

Rhymney: 1. Tn of Monmouthshire, England, 2½ m. W. of Tredegar, is the centre of a coal-mining dist., and has a clothing factory. Pop. 8930.

2. (or Rumney) Riv. forming the boundary between Monmouthshire and Glamorgan, Wales, and flowing S. into the Bristol Channel, 2 m. E. of Cardiff. Length 30 m.

Rhynchocephalians, primitive reptiles which appeared in Triassic times. *Sphenodon*, a small reptile inhabiting N. Zealand, is a survivor of this ancient group.

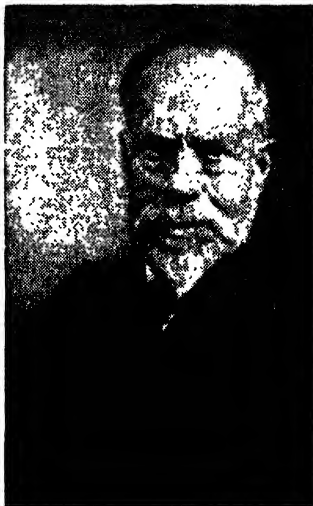
Rhynchosops, see **SKIMMER**.

Rhyncephora, see **WEEVILS**.

Rhyndacenus, see **LASCARIS, ANDREAS JOHANNES**.

Rhyolite, general term for a group of volcanic rocks characterised by acid composition, an unusually large proportion of silica, and, in many cases, a vitreous structure.

Rhys, Ernest (1859–1946), editor of *Everyman's Library* (q.v.), b. London. Educ. at Carmarthen, Newcastle-on-Tyne, and Durham, he began his career in mining engineering, but abandoned it for literature. From 1886 onwards he ed. the *Camelot* series. He wrote poetry, novels, and lyrical drama. The title of *Everyman's Library* was suggested by R. to J. M. Dent, and the series was planned from the first to reach a total of 1000 vols., which it did 10 years after his death.



ERNEST RHYIS

Beginning with *Boswell's Life of Johnson*, R. and Dent produced no fewer than 100 vols. in the first year. Besides his work as publisher's editor, he ed. also *Modern English Essays*, 1922, and *Letters from Limbo*, 1936. His stories include *The Man at Odds*, 1905, and *White Horse Pit*, 1925. *Rhymes for Everyman*, 1933, and *Song of the Sun*, 1937, are vols. of his verse, and *English Lyric Poetry*, 1913, is a book of criticism. See R.'s reminiscences, *Everyman Remembers*, 1931, and *Wales England Wed*, 1940.

Rhys, Sir John (1840–1915), Celtic scholar, b. Cardiganshire, Wales, son of a yeoman farmer. He was educ. at the Brit. school at Penllwyn, near Aberystwyth, at Bangor Normal College, and at Jesus College, Oxford. He matriculated at Leipzig, and then devoted himself to linguistic research. His *Lectures on Welsh Philology*, 1877, estab. his reputation as a Celtic scholar, and when the Jesus College professorship of Celtic was founded in 1877 he was elected the first prof. He was principal of the college from 1896 to 1915. His other philological

works include *Outlines of the Phonology of Manx Gaelic*, 1894, and various monographs on Celtic inscriptions. His historical works include *Celtic Britain*, 1879, 'Studies in Early Irish History' (pub. in the *Proceedings of the British Academy*, 1903), and *The Welsh People* (with D. Brynmor-Jones), 1900.

Rhys Davids, see DAVIDS, THOMAS WILLIAM RHYD.

Rhythm (Gk *rhythmos*, flow), regular and measured beat or movement in language, music, or action. Both verse and prose may be rhythmical, but the R. of the former is more regular and obvious, and in Eng. prosody is marked by stress or accent. True poetical R. is modified by the emotion it conveys, and is never mechanical or lifeless, while its nature varies with the subject of the verse. R. in verse is marked by feet, analogous to bars in music, and the 'time' of these is indicated by various distinctive names, trochee, dactyl, etc., which may be studied in any work of prosody.

Rhytina Stelleri, see SEA-COW, NORTHERN.

Rian-Lingga, see RIOW-LINGGA.

Riazan, see RYAZAN'.

Ribadavia, Sp. tn in the prov. of Orense, at the confluence of the Avia and the Miño. It has an anct. palace, sev. anct. churches, and is well known for its wines and hams. Pop. 8000.

Ribatejo, prov. of central Portugal, containing Santarém dist. and small parts of Lisbon and Portalegre dists. (q.v.). It was formed in 1936 from the old Estremadura prov. The prov. is generally low-lying and fertile, and is watered by the Tagus (q.v.). The prin. tn is Santarém. Area 2794 sq. m.; pop. 459,900.

Ribbentrop, Joachim von (1899-1946), Ger. politician and diplomat, b. Wees. After serving in the First World War he became a sales agent in wines and married the daughter of Henkell, proprietor of a champagne firm of Cologne. He joined the National Socialist party in 1932, becoming Hitler's plenipotentiary for foreign affairs while von Neurath was still foreign minister. He was appointed Ger. ambas. in London, where later his intense unpopularity provoked hostile demonstrations in Downing Street (1936-7). In 1937 R. replaced von Neurath, the substitution being indicative of the beginning of Hitler's expansionist undertakings; he signed the Ger.-Soviet Pact of 23 Aug. 1939. He was tried at Nuremberg (Nov. 1945-Oct. 1946) and sentenced to death. For a character sketch of R. see Sumner Welles, *Time for Decision*, 1947.

Ribble, riv. of England, 75 m. long, rises in the Pennine Chain, W. Yorks., and flowing SSE. and SW. through Lancs. passes Preston, and enters the Irish Sea at Southport.

Ribbon, Riband, or Ribband, silk with a narrow web, varying from fractions of an inch to a foot in width, used for tying, binding, and all kinds of trimmings. A modern power loom can weave as many

as 40 R.s at a time; in Jacquard looms, which turn out patterned fabrics, every warp thread is under mechanical control, so that the weft or 'shute' may be made to catch it up or not according to the design. The chief centres of manuf. are: St Etienne (France), Basel (Switzerland), Coventry (England), Krefeld (Germany), Paterson (New Jersey), and Moscow (Russia).

Ribbon-fish, term applied to any species of the family Trachypteridae. They are pelagic fishes, with elongated and compressed bodies which have a ribbon-like appearance. There is no anal fin, but the dorsal fin is as long as the body, and the ventral fins have from 1 long ray to 9 smaller ones. They are seldom found alive, and are usually seen floating dead on the surface of the ocean. *Trachypterus arcticus*, the N. R. or deal-fish, occurs in the N. Atlantic. The oar-fish or 'King of the Herrings' (*Regalecus*) also belongs to this family. The front end of the dorsal fin is crest-like and is coloured a brilliant red. The R. grows to a length of at least 20 ft. and when seen at the sea surface with its crest erected has undoubtedly been mistaken for a 'sea-serpent'.

Ribbon Microphone, see MICROPHONE.

Ribbonism, see WHITEHOY.

Ribehester, vil. in Lancs, England, on the Ribble, 5 m. from Blackburn. Remains have been found of a Rom. station called Brenntonacum. There is a museum containing many valuable Rom. remains. Pop. 1600.

Ribe: 1. Amt in W. Jutland, Denmark; it includes the ls. of Fane and Mandø. The soil is not very fertile, but there is agriculture and dairy farming. The chief port is Esbjerg on the W. coast. Area 1185 sq. m.; pop. 178,500.

2. Cap. of the above. The oldest city of Denmark, R. was an important port during the Middle Ages. It has an interesting cathedral, partly Gothic and partly Romanesque, with an organ dating from 1635. The tn declined in the 16th cent. Pop. 7610.

Ribeauville, or Rappoltsweller, Fr. tn, cap. of an arron., in the dept of Haut-Rhin, 8 m. NNW. of Colmar. It is walled, and known as the 'Pipers' tn'; there are 3 famous castles near by, Girsberg, Hohrappoltstein, and Ulrichsburg. The prin. industries are spinning, weaving, dyeing, printing, tanning, and there is an extensive wine trade. Pop. 4800.

Ribera, Sp. fishing port in the prov. of La Coruña. Pop. 13,000.

Ribeirão Preto, tn of Brazil in São Paulo State, 260 m. by rail from São Paulo city. It is a distributing centre for the state and for Minas Gerais and Mato Grosso, and produces coffee, cotton, sugar, and rice. Pop. 65,100.

Ribera, Jusepe de (1588-1656), Sp. painter, b. Játiva. He may have studied with Ribalta at Valencia, and in 1616 settled down in Naples, becoming famous as 'Lo Spagnoletto' and enjoying a steady patronage. In his realism, often rugged and extravagant, and in his leanings towards harrowing subjects, he sides with

the 'naturalist' school of Cara against Guido Reni and the other tics. The galleries of Dresden and Madrid have the best collections of R.'s works, but there is an excellent 'Pietà' of his in the National Gallery.

Ribes, *see* CURRANT; GOOSEBERRY.

Ribnica, *see* TITIGRAD.

Ribot, Alexandre Félix Joseph (1842-1923), Fr. statesman, b. St Omer, studied at the univ. of Paris and became a lawyer. He succeeded Loubet as Prime Minister, 1892-3, and headed a short-lived ministry, 1895. In 1909 he left the Chamber of Deputies for the Senate, in 1913 was a candidate for the presidency of the rep., and became Prime Minister in the spring of 1914. He was minister of finance in Viviani's second cabinet, 1914-15, and under Briand till Mar. 1917, when he became Prime Minister for the last time. *See* his letters (Eng. trans., 1925).

Ribs, arched bones which form the wall of the thorax. In the human subject they are 24 in number. The upper 7 on each side are termed *true* or *vertebro-sternal*, as they articulate with the thoracic vertebrae posteriorly and are joined to the sternum or breast-bone by cartilages anteriorly; the next 4 on each side are called *false* or *vertebro-costal*, as their anterior extremities are joined to each other, not to the sternum; the lowest is known as *floating* or *vertebral*, as its anterior extremity is free. The ribs, together with the sternum and backbone, form a bony framework, appropriately known in German as the *Brustkorb*, or 'basket', of the chest, protecting the organs of the thoracic cavity, and are capable by their arched form of resisting considerable pressure. The R. and diaphragm are responsible for the respiratory movements which fill the lungs (*see* BREATHING).

Ricard, Louis Gustave (1823-72), Fr. painter, b. Marseilles. He studied art in Marseilles and from 1844 at Paris. He first exhibited in the Salon of that year with his portrait of Mine de Sabatier, a sensational picture of the time. It is on his portraits that his fame chiefly rests.

Ricardo, David (1772-1823), political economist, b. London, son of a Dutch Jew, educ. in Holland, and then joined his father on the Stock Exchange. R. devoted much spare time to study and scientific pursuits, and was one of the original promoters of the Geological Society of London. Later in life he wrote on political economy from a mercantile standpoint, particularly on currency and taxation, and was the first to enunciate clearly the quantity theory of money. But he is chiefly remembered for his theory of rent, as to which *see* ECONOMIC THOUGHT, HISTORY OF. R. first appeared as an author during the discussions that led to the famous Bullion Committee in 1810, and his pamphlet *The High Price of Bullion a Proof of the Depreciation of Bank Notes* passed through 4 eds. R.'s next pub. was *A Reply to Mr Bosanquet's Practical Observations on the Report of the Bullion Committee*, 1811, which was fol-

lowed by *An Essay on the Influence of a Low Price of Corn on the Profits of Stock*, 1815. His great work, *On the Principles of Political Economy and Taxation*, appeared in 1817, and was pronounced the most valuable contribution made to economic science since the days of Adam Smith. R. was M.P. for Portarlington (1819-23). His collected works were ed. by J. R. McCulloch in 1846. *See* also CLASSICAL ECONOMISTS. *See* life by J. H. Hollander, 1910.

Ricasoli, Bettino, Baron (1809-80), It. statesman, b. Bioglio. As Gonfaloniere of Florence (1848) he tried to thwart the reactionary policy of the Grand Duke of Tuscany. Having been instrumental in the union of Tuscany with Piedmont (1860), he accepted, on Cavour's death (1861), the premiership, recalled Mazzini, and on his recession to office (1866) made conciliatory but ineffectual overtures to the Vatican.

Ricci, Matteo (1552-1610), It. missionary to China, b. Macerata, joined the Society of Jesus in 1571, and after 4 years' work in India (1578-82) undertook the evangelisation of China. In 1601 he estab. himself in Peking, where he was the first Catholic missionary. He wrote in Chinese sev. theological and geographical treatises. *See* V. Cronin, *The Wise Man from the West*, 1955.

Ricci, or Rizzo, Sebastiano (1659-1734), It. painter, b. Belluno, in the Venetian ter. He was invited to the court of Vienna, to decorate the palace of Schönbrunn. He worked for some years for Queen Anne at Hampton Court but d. in Venice. *See* study by J. von Derschau, 1922.

Ricciolo, Andrea (1470-1532), It. architect, sculptor, and goldsmith, b. Padua, his proper name being Rrisoco. He was influenced by Mantegna and the Venetian artists. He is noted for beautiful bronze reliefs in the church of St Antonio, Padua, and for the tomb of Girolamo della Torre at Verona (now in the Louvre). *See* study by L. Planiscig, 1927.

Ricciolo, or Rizzio, David (1533-66), It. musician, b. Pancalieri. He came to Scotland in 1561 in the train of the ambas. of the Duke of Savoy, and became known to Mary Queen of Scots, who in 1564 appointed him her Fr. secretary. He soon acquired great influence with Mary, and to some degree directed her policy, which greatly angered her husband Darnley and sev. of the nobles. On suspicion of being the queen's lover, he was seized in her presence and killed in an adjacent room.

Riccioli, Giovanni Battista (1598-1671), philosopher and mathematician, b. at Ferrara. A member of the Society of Jesus, he lectured on philosophy and rhetoric in the univs. of Bologna and Parma. It is, however, upon his proficiency in astronomy that his reputation principally rests, on which subject he pub. some valuable works, viz. *Astronomia Reformata*; *Chronologia Reformata*; and the *New Almagest*. He followed Hevelius in naming lunar mountains after

terrestrial ones, but adopted Langrenus's method of assigning to the craters the names of astronomers and other learned men, the ancients at the N. and the moderns towards the S. In addition, the dark areas were given names, as seas, drawn from the supposed influences of the Moon upon the Earth. Those on the W. had suggestions of peaceful weather, but those on the E. referred to storms.

Rice, Alice Hegan (1870-1942), Amer. novelist, b. Shelbyville, Kentucky. Her first novel, *Mrs Wiggs of the Cabbage Patch*, appeared in 1901 and was a great success. In the following year she married Cale Young Rice, the poet, with whom she collaborated in some books. Of her own novels *Lovely Mary*, 1903, was the only one that approached her first in popularity. Others are *Sandy*, 1905, *Mr Opp*, 1909, *A Romance of Billy-Goat Hill*, 1912, *Quin*, 1921, and *Our Ernie*, 1939. *The Inkly Way*, 1940, is an autobiography.

Rice, Elmer (1892-), Amer. playwright and novelist, b. New York, his real name being Elmer Reizenstein. He graduated from New York Law School and became a solicitor's clerk, but quickly abandoned this for writing. In 1914 his first play, *On Trial*, was produced. This was remarkable for his use of 'flash-backs' to portray episodes described by the witnesses in the play, a technique more common to the cinema than to the stage. After the First World War he became a leading supporter of Expressionism (q.v.), and his second great success, *The Adding Machine*, 1923, was a satirical fantasy embodying expressionist ideas. He showed a deep interest in the problems of ordinary Amer. society, and *Street Scene* won him the Pulitzer prize in 1929. In *Judgment Day*, 1934, he dealt with the issues raised by the Reichstag fire trials. Others of his plays are *Subway*, 1929, *The Left Bank*, 1931, *We, the People*, 1933, *American Landscape*, 1939, *Two on an Island*, 1940, *Dream Girl*, 1946, and *Grand Tour*, 1952.

Rice, James (1843-82), novelist, b. Northampton. Educ. at Cambridge, he studied law and was called to the Bar in 1871. In the following year he pub. the highly successful novel *Ready Money Mortiboy*, which he had written in collaboration with Walter Besant (q.v.). Other novels produced by the same partnership are *The Golden Butterfly*, 1876, *The Monks of Thelema*, 1877, *By Celia's Arbour*, 1878, *The Chaplain of the Fleet*, 1879, and *The Seamy Side*, 1881. *A History of the British Turf*, 1879, was written by R. alone.

Rice (*Oryza sativa*), marsh plant (family Gramineae) cultivated in nearly all hot countries where capable of artificial irrigation. The grain is rich in starch, and probably supports a greater number of human beings than any other cereal. It is the removal by 'polishing' or milling of the cortical and sub-cortical layer, the cells of which contain aleurone and vitamin B, that causes beri-beri (q.v.) amongst those with whom R. is a staple diet. R. in the husk is known as 'paddy' or

'padi.' The granules of R. starch are angular and minute. R. is grown throughout the Far E., in Egypt and other Mediterranean countries, Brazil, the U.S.A., and in some W. Indian Is.



E.N.A.

A WORKER IN JAVA UNTYING SHEAVES OF RICE FOR DRYING

Rice Bird, Paddy Bird, or Java Sparrow (*Alunia oryzivora*), weaver bird, which is one of the worst avian enemies of the rice cultivator and is indigenous in Java, Sumatra, and Malacca. See also BOBO-LINK.

Rice-paper is made from the pith of *Falsia papyrifera*, a tree which grows in the Is. of Formosa. The paper is much used in China and Japan for brightly coloured pictures and designs. It is also employed in making artificial flowers. A paper has been prepared by the Japanese from rice straw. See also PAPER.

Rich, Claudius James (1787-1820), orientalist and traveller, b. Dijon and educ. at Bristol. His proficiency in the E. languages was so great that he was made a writer to the E. India Company at the age of 17, and finally became their resident at Bagdad. He displayed his great literary talents in 2 memoirs on the ruins of Babylon and on the site of anc. Nineveh, and his valuable collection of about 900 vols. of oriental MSS., together with a large number of Gk and oriental coins and gems and antiquities from Babylon, was purchased by the trustees of the Brit. Museum. See S. Lloyd, *Foundations in the Dust*, 1947.

Rich, Edmund, see EDMUND (RICH), Sr. Rich, John (1692-1761), actor, noted for his development of pantomime at Covent Garden in the 18th cent. At Lincoln's Inn Fields (1723) he produced *The Necromancer*, or *History of Dr Faustus*. Taking his inspiration for Eng. pantomime from the Fr. and It. harlequins and scaramouches, he used a serious legendary story told operatically by dance and song.

Rich, Lady Penelope (c. 1562-1607), daughter of Walter Devereux, 1st Earl of Essex (q.v.). She is the Stella of Sir Philip Sidney's (q.v.) sonnets *Asiophil* and *Stella*. Her father had wanted her to marry Sidney. In 1581, however, she was forced into a marriage with Robert, baron Rich. After Sidney's death she became the mistress of Charles Blount, Lord Mountjoy, whom she married in 1606, after her husband had divorced her.

Richard I, called **Richard Cœur-de-Lion** (1157-99), King of England, third son of Henry II and Eleanor of Poitou. He became Duke of Aquitaine in 1170, succeeded to the Eng. throne in 1189, and at once prepared to join the third crusade. He reached Acre in June 1191, within a month forced it to surrender, and shortly after took possession of Ascalon. He defeated Saladin near Arsuf in that year, and in the following year defeated him again at Jaffa. His brother John having usurped his authority at home, he was compelled to conclude a truce, and hastened to Europe. Traveling in disguise through Europe, he was captured near Vienna by the Duke of Austria, who handed him over to the Emperor Henry VI. He had to pay a ransom of 150,000 marks for his freedom, which he obtained in Mar. 1194. The return of Richard settled the fate of John's insurrection, but owing to the alliance between John and Philip Augustus, King of France, he was unable to return to the E., as had been his intention. He went to Normandy in May 1194, defeated Philip, and 2 years later made peace with him. He was mortally wounded in besieging the castle of Chalus. During R.'s reign important constitutional, financial, and legal developments occurred. His long absences made necessary baronial co-operation to carry on the administration of the kingdom; offices were sold and constant scutages levied in an effort to meet R.'s financial demands; the coroner became an essential figure in the operation of Eng. law. The accounts of the chroniclers point to R. as the most popular of all medieval Eng. kings; it seems clear that he was personally brave, probably devout, and appealed to the imagination of the London mob. But his relations with the King of France illustrate his lack of diplomacy; and it may be suggested that he laid the foundations for the baronial revolt of 1214. During his reign financial exactions became unprecedentedly heavy; his policy left an empty exchequer and marked the beginning of the Angevin expulsion from France; while his absence showed the baronial party how to unite to support an absent monarch, a process they were later to adopt to coerce a recalcitrant one. See W. E. Aytoun, *Life and Times of Richard I*, 1840; J. H. Ramsay, *The Angevin Empire*, 1903; R. L. Poole, *The Angevin Empire in the Twelfth Century*, 1912; Kate Norgate, *Richard the Lion Heart*, 1924; and C. Wilkinson, *Richard Cœur-de-Lion*, 1933.

Richard II (1367-1400), King of Eng-

land, was the younger son of Edward, Prince of Wales ('the Black Prince'), and succeeded Edward III in June 1377. During his minority there was a struggle for the control of affairs, and in 1381 the Wat Tyler insurrection broke out. He married (1382) Anne, sister of Wenceslaus, King of Bohemia, and in that year, attaining his majority, attempted to wrest the government of the country from John, Duke of Lancaster. He appointed Michael de la Pole, whom he created Duke of Suffolk, as chancellor, and, though he sent Lancaster on a mission to Spain, he had to contend against the nobles, who resented the appointment. The struggle was continuous until 1397, when the Earl of Arundel and the Duke of Gloucester were condemned to death. A rising in 1399, under Henry of Lancaster, Duke of Hereford, was successful, and R. surrendered and was imprisoned at Pontefract, where he died on 14 Feb. 1400. His first consort, Anne of Bohemia, died in 1394, and 2 years later he married Isabella, daughter of Charles VI of France. R.'s position was from the start difficult; he succeeded to a kingdom weakened by expensive wars and disheartened by recent defeats, disorganised by the Black Death, in the midst of a period of social transition, and suffering from the emergence of the 'overmighty subject,' the result of Edward III's cessions to his many sons. R. became unpopular because of developments arising from his predecessor's policy, and for actions taken in his name by others during his long minority; an unhappy childhood may have been responsible for his unbalanced character. His reign was a conflict in which R. appears as struggling for the trappings of power even more than for the sake of the power itself; he has been called the last of the medieval Eng. kings to rule by virtue of divine right; his defeat marks the end of a theory for 200 years. His actions, especially in his last years, suggest a progress from chronic instability to something closely allied to insanity. He failed to keep his throne, not because of his arbitrariness, but because he lacked the political sense of Henry Bolingbroke, and was increasingly governed by emotion. See C. Oman, *The Great Revolt of 1381, 1396, and life by A. Steel*, 1941.

Richard III (1452-85), King of England, son of Richard, 3rd Duke of York, and younger brother of Edward IV (q.v.). When Edward d., 1483, Richard was appointed regent during Edward V's minority. He set about the overthrow of the Woodville faction, and, having succeeded in this, disposed of one by one of anyone else who stood in his way to the crown. By the end of June 1483 R. was king, and Edward V and his brother were in the Tower, having been declared illegitimate. The offer of the crown to R. by an incomplete parliament gave a legal cloak to an act which was nothing more than a seizure of power by force. Trouble began almost at once. R. quarrelled with his chief supporter, Buckingham, who

raised a rebellion. This failed, and Buckingham was executed, but R.'s arbitrary rule soon lost him most of his remaining followers among the nobility, while popular discontent was fomented by the suspicious circumstances of the young princes' deaths in the Tower. When Henry of Richmond, the sole remaining Lancastrian claimant to the throne, invaded the country in 1485 he could command widespread support. R. met him in battle at Bosworth, and was defeated and killed.

R.'s character is still something of an enigma to the historian, and much research remains to be done on the events of his reign, at present one of the most obscure in 15th-cent. hist. The chroniclers' accounts are disjointed and conflicting, and vital material may well have been suppressed by later monarchs. The suspicious circumstances of his accession dogged him; personally intelligent and brave, and apparently popular on his northern estates, R. appears to have been gradually overwhelmed by his own ambitions and to have lacked the political skill and finesse which had in the past made similar seizures of power a success. Though admirably suited to the position of regent, he failed to grasp that an attempt by so partisan a personage as himself to win the crown could not hope to succeed without the continuing support of powerful interests that he could, or would, not conciliate. J. Gairdner's life of R. (1878) is still the standard authority on the subject; a life by P. M. Kendall, 1956, is an interesting study of R., presenting him in an unusually favourable light, and giving a further theory on the mystery of the princes in the Tower.

Richard de Bury, see AUNGERVILLE.

Richard of Cirencester (c. 1335-c. 1401), chronicler, was a native of Cirencester, Gloucestershire. In 1350 he joined the Benedictine Abbey of St Peter, Westminster. The MS. of his unreliable compilation, entitled *Speculum Historiale de Gestis Regum Anglie, 447-1066*, is in the Cambridge Univ. library.

Richard of Cornwall (1209-72), second son of John, King of England, assisted William of Salisbury in the recovery of Gascony (1226). The following year Henry III was compelled by his barons to settle Cornwall on his brother. In 1257 Richard was crowned titular king of the Romans. He was at one point the leader of baronial opposition to Henry III; but during the de Montfort rising he supported Henry, and suffered a year's captivity (1264). See life by N. Denham-Young, 1947; also Sir F. M. Powicke, *Henry III and the Lord Edward*, 1947.

Richardia, see ZANTEDESCHIA.

Richards, Sir Gordon (1904-), jockey, b. Oakengates, Salop. His father was a miner, and R. learned to ride pit-ponies. He was apprenticed to M. Hartigan, the trainer, and first raced in 1920, becoming champion jockey 5 years later, a position he held for more than 20 years, with only short intervals in 1926, 1930, and 1941. In 1947 he broke all records by riding 269

winners. He had already in 1943 beaten Archer's (q.v.) record by winning his 2750th race at Windsor. Knighted 1953, retired 1954; now training.

Richards, Ivor Armstrong (1893-), critic, b. Sandbach, Cheshire. Educ. at Clifton and Magdalene College, Cambridge, of which he became a Fellow, from 1922 to 1929 he was a lecturer in English. He then became a visiting prof. of Tsing Hua Univ., Peking, and from 1944 was prof. of English at Harvard. A leading authority on semantics, he collaborated with C. K. Ogden in *The Meaning of Meaning*, 1923, and with him was the founder of Basic English (q.v.). R.'s critical works, which have had great influence, include *Principles of Literary Criticism*, 1924, *Science and Poetry*, 1925, *Practical Criticism*, 1929, and *The Philosophy of Rhetoric*, 1936.

Richards, Theodore William (1868-1928), Amer. physicist, b. Germantown, Pennsylvania, became prof. of chemistry at Harvard. His work on the revision of the atomic weights of the elements won him the Nobel prize in 1914. He also made researches into the structure of the atom, and worked on thermochemistry and thermodynamics.

Richardson, Sir Albert Edward, P.R.A. (1880-), architect, b. London; was trained there, and began practice with C. L. Gill in London in 1908. Between 1908 and 1939 built many blocks of office-buildings in the City, did much work on the Duchy of Cornwall estates, and built the Opera House at Manchester. His more recent work, mostly in partnership with E. A. S. House, includes the Jockey Club, Newmarket; the Royal Pavilion, Ascot; the restoration of York Minster; Ripon Hall, Oxford; the Great Hall, University College, London; and the rebuilding, after bombing, of Somerset House, Trinity House, the Carlton Club, University College, St James's, Piccadilly, and St Alphege, Greenwich—all in London; the rebuilding of St Mary's College, Twickenham; extensions at Christ's College, Cambridge, and at Jesus College, Oxford. He has also written sev. books on the theory and history of architecture. He was prof. of architecture at London Univ. 1919-46; then at the Royal Academy. In 1947 he was awarded the R.I.B.A. Royal Gold Medal. He became President of the Royal Academy in 1954.

Richardson, Dorothy Miller (1873-1957), novelist, b. Abingdon, Berks. She married Alan Odle, the artist. *Pilgrimage* is the collective title she gave to her novels, which include *Pointed Roofs*, 1915, *Backwater*, 1916, *Honeycomb*, 1917, *The Tunnel*, 1919, *Interim*, 1919, *Deadlock*, 1921, *Revolving Lights*, 1923, *The Trap*, 1925, *Oberland*, 1927, *Dawn's Left Hand*, 1931, *Clear Horizon*, 1935, and *Dimple Hill*, 1938. Her work belonged to the 'stream of consciousness' school, and she tried to reconstruct reality as a series of impressions in the mind of one person; in this she anticipated Joyce and Virginia Woolf (qq.v.). See study by J. C. Powys, 1931.

Richardson, Henry Handel, pseudonym of Ethyl Florence Lindessay Richardson (1870-1946), Australian novelist, b. Melbourne. She went to school in Melbourne, and studied music and German at Leipzig. While there she married John G. Robertson, who became prof. of German at London Univ. Leipzig supplies the background for her first novel, *Maurice Guest*, 1908, a book of rare imaginative power not unworthy of Flaubert or even Tolstoy. In 1910 appeared a story of school life entitled *The Getting of Wisdom*, a book, curiously enough, showing far less maturity than her first. But with the pub. in 1917 of *Australia Felix*, the first vol. of her Australian trilogy *The Fortunes of Richard Mahony*, she had launched out on her best work. The background of this vol. is Ballarat in the gold rush, and its keynote is frustration and cultural barrenness. The second vol., *The Way Home*, 1925, reflects the contrast between 'colonial intelligence' and Eng. social civilisation, and the concluding vol., *Ultima Thule*, 1929, shows the frustrated Mahony gripped by insanity. Other books are *The End of a Childhood* and *Other Stories*, 1934, and *The Young Cosima*, 1939, in which Wagner and Liszt are interpreted with brilliant insight, though the dominant figure is Cosima herself. Intensity and seriousness are the main features of her work, and in the opinion of many she is to be remembered as the most remarkable novelist Australia has produced. See study by N. Palmer, 1950; also AUSTRALIAN LITERATURE.

Richardson, Henry Hobson (1838-86), Amer. architect, b. St James, Louisiana. He studied at the Ecole des Beaux Arts in Paris, after graduating at Harvard (1859). In Boston, where he lived, he designed Trinity Church (1872); also the co. buildings at Pittsburgh, the Sever and Austin Halls at Harvard, the City Hall, Albany; sev. railway stations; and the tn hall and library of N. Easton. His style is mainly derived from the Romanesque, but is original.

Richardson, Sir Owen Willans (1879-), physicist, b. Dewsbury, educ. at Batley Grammar School and Trinity College, Cambridge. He was prof. at Princeton, U.S.A., 1906-14, and at King's College, London, 1914-24. In 1913 he was elected F.R.S. His most important pubs. are *The Electron Theory of Matter*, 1914, *The Emission of Electricity from Hot Bodies*, 1916, and *Molecular Hydrogen and its Spectrum*, 1933.

Richardson, Sir Ralph David (1902-), actor, b. Cheltenham and educ. at the Kaverian College, Brighton. His first stage appearance, as Lorenzo in *The Merchant of Venice*, was in Brighton in 1921. In 1926 he appeared in *Yellow Sands* at the Haymarket Theatre, London. He toured S. Africa in 1929; from 1930 to 1932 he played two seasons at the Old Vic and two seasons at Malvern. He entered films in 1933 and gave outstanding performances in *South Riding*, *The Citadel*, *The Silver Fleet*, *The Fallen Idol*, *The Sound Barrier*, and *Richard III*.

In 1944 R. rejoined the Old Vic as joint director. Since the Second World War he has played in *Peer Gynt*, *The Alchemist*, *Cyrano*, and *Uncle Vanya*; at Stratford in 1952 he appeared in *Macbeth* and *Volpone*. His most notable Shakespearean part has been his superb rendering of Falstaff in *Henry IV*. Modern plays in which he has appeared include *An Inspector Calls*, *The Heiress*, *A Day by the Sea*, and *Flowering Cherry*. R. was knighted in 1947.

Richardson, Samuel (1689-1761), novelist and printer, b. Derbyshire, son of a cabinet-maker. Apprenticed to a London stationer, he married his master's daughter, and in 1719 set up his own printing business, rising eventually to be Master of the Stationers' Company. Prosperous at the age of 50, he had his own country house at Fulham. His manner of drifting into authorship was unorthodox. It had been his habit as a youth to write love letters for young women of his acquaintance who were not equal to composing them. It was now suggested by 2 of his friends in the book trade that he should write a small vol. of model letters 'on such subjects as might be of use to country readers who were unable to indite for themselves.' This manual he produced (and in 1728 it was reprinted) with the title *Familiar Letters on Important Occasions*. After working on this he had the idea of publishing a series of letters that would be a guide to conduct, and the collection developed into the story *Pamela, or Virtue Rewarded*, 1740, which told how a virtuous servant-girl repelled the dishonourable advances of her master, reforming and ultimately marrying him. Though he did not realise it, R. had founded a new and very important section of literature, for *Pamela* is usually regarded as the first real Eng. novel. It was extremely popular, and gave rise to a number of satirical parodies, one of which, by Fielding, developed into his *Joseph Andrews*, and so gave us the beginnings of a much more robust and masculine type of fiction. Later novels by R. were *Clarissa*, or *the History of a Young Lady*, 1747-8, and *The History of Sir Charles Grandison*, 1754.

The most obvious fault of R.'s novels is their prolixity. As Dr Johnson declared, 'if you read R. for the story, your impatience would be so much fretted that you would hang yourself.' But of R.'s insight into human and especially feminine human nature there could be no question. He was in fact the father of the psychological novel. His work was very popular both in his own country and abroad, and if it is little read now, it is mainly because a less leisured generation has not time for his leisurely style. The standard ed. is by Leslie Stephen, 1883. See studies by C. L. Thomson, 1900; A. Dobson, 1902; B. W. Downs, 1928; and A. D. McKillop, 1936.

Richborough: 1. Name given to the extensive remains of the Rom. fortress and station of *Rutupiae*, often mentioned by the Latin authors, chiefly as a port of

arrival in Britain, and in particular by Juvenal for its oysters. The site lies on the R. Stour, just N. of Sandwich (Kent), but outside the bor.; it has been scientifically excavated and is one of the show-places of Rom. Britain. Its real importance began with the invasion of Claudius in AD 43, and the defensive ditches of the base camp have been located, as have the granaries and other wooden buildings of the supply depot which followed the Claudian camp. About AD 85 the camp area was cleared for the erection of a magnificent marble-cased building furnished with bronze statues, probably to mark the final conquest of Britain by the Emperor Domitian; the great cruciform foundation of it still exists. There was intensive occupation in the 2nd cent., while in the second half of the 3rd cent. an earthwork fort with triple ditches was built to protect the coast from sea raiders; the ditches as excavated may still be seen. The most prominent feature of the site is the great stone walls and ditches of the Fort of the Saxon Shore, one of a series built as a defence from the Saxon pirates and sited round the coast of SE. Britain from the Wash to Portsmouth. R. was probably built in the reign of the usurper Carausius (AD 287-93), who set himself up as emperor in Britain. There was still an intensive occupation late in the 4th cent., and even in the early 5th cent. More than 300 wells and rubbish pits in the area have been completely excavated, and the most interesting of the objects found in these pits and elsewhere on the site are preserved in the museum. See *Society of Antiquaries Research Reports, Richborough, I, II, and III, 1926-32.*

2. Port and harbour on the SE. coast of Kent, England, created in 1916 as a war-transport depot. R. lies on a bed of the R. Stour, in the bor. of Sandwich, and in both world wars maintained a train-ferry with France. In the Second World War it was an embarkation port for the invasion of Normandy, and for many other missions, and here units of Pluto (see PIPE LINES) and 'Mulberry' harbour were made.

Richelieu, Armand Jean du Plessis, Cardinal, Duc de (1585-1642), Fr. statesman, b. Paris. He was originally intended for the Army, but when his elder brother resigned the bishopric of Luçon, in the family prefferment, R. was given the benefice. After obtaining a dispensation from Rome, because of his youth, he was consecrated Bishop of Luçon in 1607. He soon showed a flair for politics, and possessed in large measure the necessary craft, clear-headedness, and callousness. In 1614 he was a clerical deputy at the States-General. He then became almoner to Anne, wife of Louis XIII, and by gaining the favour of the queen-mother, Marie de' Medici, and her confidants was made secretary of state. After Concini's murder R. accompanied Marie to Blois, and eventually procured her return and reconciliation with her son. He was rewarded with a cardinal's hat (1622), and by 1624 was chief minister

and the supreme power in the country. In 1631 he received a dukedom. Many plots were directed against him: the Duke of Orleans waged a constant struggle with R. between 1626 and 1632, and R. broke the conspiracy of Cinq-Mars in the last year of his life. His ability, patriotism, and resolution are undoubted. Personally frail, and frequently ill, he yet conducted campaigns in person; incapable of inspiring affection, he nevertheless retained the confidence of the king from the time of his accession to power until his death, in spite of the ceaseless antagonism of the court. His courage and competence, coupled with a highly efficient system of espionage, made him proof against all intrigues and assured his successive triumphs.

During the period of his power he kept constantly before him the ideal of a state in which the power of the Crown would be absolute, and which should be supreme and unassailable in Europe, and he did much towards its realisation. When he



Engraving after the portrait by Philippe de Champagne.

took office the royal power was limited in 2 directions. The Huguenots still enjoyed a certain amount of dangerous freedom, and the great nobles retained a degree of power and privilege which was incompatible with unfettered monarchical authority. R. devoted all his energies to the subjugation of Huguenots and nobles. At La Rochelle (1628) the Huguenots were crushed as rebels, but were allowed to retain their civic privileges and religious toleration. The nobility's power was curbed; fortified castles were destroyed, and local administration placed in the hands of civil servants. The nobles were encouraged to become court parasites. Abroad, France was still menaced on every frontier by the power of the Hapsburgs.

R. intervened in the Thirty Years War with the skill of the master-intriguer, giving subsidies to the Hapsburgs' opponents, even to the King of Sweden, the champion of Protestantism. He saw the struggle as a war of ter., not of religion, and his efforts ensured that at the peace of Westphalia France gained strengthened frontiers and enhanced prestige. As a patron of science and literature R. rebuilt and endowed the Sorbonne, and founded the royal printing house at Paris, the botanic garden, and the Fr. Academy. Of his writings, his memoirs (ed. by J. Lair and Baron de Courcel, 1907-12) are still of interest.

R.'s place in Fr. hist. can scarcely be exaggerated. He prepared the way for absolute monarchy in France, and he destroyed the Hapsburg menace to Fr. independence. The worthiness, to France, of his ends has made him a national hero; but his means were more questionable. He was extravagant and improvident. In his selection of ministers and capt. he looked for subservience rather than for initiative, and it is significant that the most decisive victories of France in the Thirty Years War were won after his death. Under him the checking of natural political developments began, which led eventually to the revolution; but he laid the foundations for the glory of expansion of France under Louis XIV. See lives by G. Hanotaux (new ed., 1933-6); E. C. Price, 1912; K. Vedern (Eng. trans., 1928); H. Belloc, 1930; and C. J. Burckhardt, 1940.

Richelleu (called also St John, or Chambly), riv. of Quebec, Canada, navigable below Chambly; rising in Lake Champlain and flowing due N. to the St Lawrence, which it meets at Sorel on Lake St Peter.

Richopin, Jean (1848-1926), Fr. poet, dramatist, and novelist, b. Médéa, Algeria. He studied letters at the École Normale. In 1870 he fought with the *franc-tireurs* of the army of Bourbaki, and this experience is reflected in his early poems. After the war he was an actor, then he went to sea, and afterwards entered journalism. His work is considerable both in quantity and in quality, of prose, verse, and drama. His first poems, *La Chanson des gueux*, appeared in 1876, and cost him a month in prison and a fine; they were followed by *Les Caresses*, 1877, *Les Blasphèmes* (an atheist Bible), 1884, *La Mer* (description of sailor life), 1886, *Mes Paradis*, 1894. His most brilliant play is *La Glu*, 1881. Others include *Le Filibustier*, 1888, *Par le glaive*, 1892, *La Martyre*, 1897, *Don Quichotte*, 1905; these formed part of the repertory of the Comédie Française, of which he was for a time director. A famous play of his, with music by Xavier Leroux, is *Le Chemineau*, 1897. He acted with Sarah Bernhardt in his Indian verse drama *Nana Sahib*, 1883. Among his novels are *Les Morts bizarres*, 1877, *Madame André*, 1877, and *Marika*, 1883.

Richet, Charles Robert (1850-1935), Fr. physiologist, b. Paris and educ. there.

From 1887 to 1927 he was prof. of physiology at Paris Univ. R. became famous through his discovery of anaphylaxis (1890), and was awarded the Nobel prize in 1913 for his work on this subject. He also studied the treatment of nervous diseases, and his work on serum therapy was of great importance. He collaborated in the writing of a physiological dictionary, and ed. the *Revue scientifique*.

Richl, Alois (1844-1924), Austrian philosopher, b. Bozen, a follower of the neo-Kantian school. He attempted to limit philosophy to a theory of cognition, and from this arrived at a pure formalism. His chief pub. was *Der philosophische Kritizismus und seine Bedeutung für die positive Wissenschaft*, 1876-87, 1924-6. See study by C. Siegel, 1932.

Richmond, Sir Herbert (1871-1946), sailor and naval historian. In his naval career he reached eminence on the technical side as a torpedo officer, and later became recognised as a leading authority not only on naval hist. but on naval strategy. As a capt. he commanded the famous battleship *Dreadnought*; as rear- and vice-adm. he was commander-in-chief on the E. Indies station. When in 1927 the College of Imperial Defence (q.v.) was formed he was its first commandant. R. was made K.C.B. in 1926 and adm. in 1929. In 1934 he succeeded Dr Holland Rose as Vere Harmsworth prof. of imperial and naval hist. at Cambridge, and later was elected to the mastership of Downing College. His original researches into naval hist. found expression in *The Navy in the War of 1739-48*, 1920, *The Navy in India, 1763-83*, 1931, and various pamphlets. Pubs. on the modern application of the strategical lessons of hist. include *National Policy and Naval Strength*, 1922, 1934, *Economy of Naval Security*, 1931, and *Sea Power in the Modern World*, 1934; also, chiefly for naval consumption, *Command and Discipline*, 1930, and *Naval Training*, 1935. His Ford Lectures (1943) at Oxford were pub. in 1946 as *Statesmen and Sea Power*.

Richmond, Sir William Blake (1843-1921), painter, b. London, studied at the Royal Academy and in Italy. In his youth he was influenced by the pre-Raphaelites. He was Slade prof. of fine art at Oxford, 1878-83, and R.A. in 1895. In 1891 he undertook the decoration of St Paul's Cathedral in mosaic. Much of his best work is in portraits.

Richmond: 1. Municipal bor. of Surrey, England, and residential suburb of Greater London. R. Hill to the SE. commands a fair and famous prospect of meadows, uplands, woods, and of the ls. of the winding Thames, on which the tn stands. The stately park (2357 ac.) was once the deer forest and pleasure ground of Charles I. A gateway is the one memorial of the royal palace of Sheen, where Edward III and Elizabeth I died, and where Wolsey lived. Henry VII, who renamed the tn after his earldom, held a splendid tournament here in 1492. Kean,

who leased the theatre (estab. in 1719), lies buried in the par. church, as does the poet James Thomson (1700-48), author of *The Seasons*. Pop. 42,440. See R. Crisp, *Richmond and its Inhabitants*, 1868; E. B. Chancellor, *History and Antiquities of Richmond*, 1894; H. M. Cundall, *Bygone Richmond*, 1925; and K. Courlander, *Richmond*, 1953.

2. Anct chartered bor. and mrkt tn, at the foot of Swaledale in the N. Riding of Yorks, England; the centre of farming dists. and a garrison tn serving Catterick ('camp' near by). Of the castle, founded by Alan Rufus in 1071, there remains the Norman keep, situated on a natural eminence above the Swale. R.'s historical associations, old churches, Georgian theatre, and large cobbled square give it a unique place among Yorkshire tns. A mile from the tn lie the ruins of Easby Abbey, founded 1152, beautifully situated near the R. Swale. Pop. 7000. See D. Brooks, *The Story of Richmond*, 1946.

Richmond: 1. Cap. of Virginia, U.S.A., 100 m. SSW. of Washington, standing on the James R. (130 m. from its mouth), whose falls supply power. The state's largest city, it is the financial, cultural, commercial, transportation, and distribution centre of the South, a port of entry and a seaport. A great tobacco market and tobacco-processing centre, it also manufs. synthetic textiles, fertilisers, metal goods, foundry products, food products, chemicals, agric. equipment, and furniture; printing and publishing are extensively carried on, and there are railroad shops. The city's long history began in 1637; it became cap. of Virginia in 1779, and was incorporated as a city in 1782. R. was the objective of Federal troops during the Civil war, and finally fell in April 1865. It is the seat of the Union Theological Seminary, R. Professional Institute, the College of William and Mary, Union Univ. (for Negroes), the Medical College of Virginia, and the univ. of R. In Capitol Square stand the Washington Monument (1858) and a bronze statue to Stonewall Jackson, besides the historic capitol (1785-92). Edgar Allan Poe lived in R. Pop. 230,310.

2. Bor. of New York city, U.S.A. Pop. 191,500; area 57 sq. m.

3. City, co. seat of Wayne co., Indiana, U.S.A., in agric. area 67 m. E. of Indianapolis. A railway centre, it manufs. aluminium, machine tools, machinery, bus bodies, furniture, etc. It is the seat of Earlham College (1859), controlled by the Friends, who founded the city. Pop. 39,500.

4. Busy industrial city, suburb of Melbourne (q.v.), Victoria, Australia.

5. City of Contra Costa co., central California, U.S.A. It is a deep-water port and manufacturing centre, with oil refineries, automobile assembly plant, railroad shops, foundries, and canneries. It also has large shipyards. Pop. 99,500.

Richmond and Gordon, Charles Henry Gordon-Lennox, sixth Duke of (1818-1903), soldier and politician, b. London, and educ. at Westminster and Oxford.

He served in the Horse Guards till 1844, was aide-de-camp to the Duke of Wellington (1842-52) and to Lord Hill (1852-48). In 1870 he was made leader of the Conservative party in the House of Lords, in 1874 lord president of the council, and in 1885-6 was secretary for Scotland.

Richmond and Lennox, Frances Teresa Stewart, Duchess of (1647-1702), mistress of Charles II. Her father was a physician. After being educated in France she came to England as a maid of honour to Catherine of Braganza, and became the king's mistress about 1663. She was a noted beauty, and was the original model for Britannia on Brit. coins.

Richmond and Steveston, municipality of Brit. Columbia, Canada, 6 m. S. of Vancouver, at the mouth of the R. Fraser, includes Sea and Lulu Is., on the former being Vancouver airport. Salmon is canned at Steveston on Lulu Is. Pop. 25,852.

Richmond Heights, city of St Louis co., E. Missouri, U.S.A., near Mississipp R. W. of St Louis. Pop. 15,045.

Richter, Hans (1843-1916), Austrian conductor, b. Győr, Hungary, studied the violin, horn, and theory at Vienna Conservatory, 1860. In 1866 he met Wagner, with whose music he became pre-eminently associated. After visits to various European caps. he assumed command of court opera and the philharmonic concerts in Vienna, 1875. In 1877 he made his début in England at the Albert Hall Wagner concerts, and in 1879 he founded the R. concerts. From 1897 he was associated chiefly with Manchester as conductor of the Hallé Orchestra, but he also did important work at the Birmingham festivals and at the Covent Garden Opera House. Besides being a Wagnerian authority, he presented sev. of Elgar's works for the first time. Elgar dedicated his first Symphony to him. R. d. at Bayreuth.

Richter, Johann Paul Friedrich (1763-1825), Ger. humorous and satirical writer, b. Wundtzel, Bavaria, generally known as Jean Paul, the Fr. pen-name which he himself adopted. R. was intended for the Church, and was sent in 1781 to the univ. of Leipzig; but soon he determined to become a writer. His first efforts in this direction, of a satirical nature, were not received with much favour, but in 1793 there appeared *Die unsichtbare Loge*, which brought him immediate fame. To this period also belong 2 idylls of a more finished character than is general in R.'s works, *Dominie Wau*, 1793, and *Quintus Firlein*, 1796. In 1801 he married Caroline Meyer, and in 1804 finally settled in Bayreuth, where he lived a placid, simple life. The period following his marriage was prolific in literary productions. In 1800-3 he wrote his great romance, *Titan*, which he himself held to be his prin. novel, and *Fliegjahre* in 1804-5. His satirical style appears again in *Reise des Feldpredigers Schmelzle nach Flätz*, known to Eng. readers through Carlyle's trans. An idyll, *Leben Fibels*, appeared in 1812. He wrote on education

in his work *Levana*, 1807, and propounded his theory of art in the *Vorschule der Aesthetik*, 1804.

There is a good deal of imaginative incoherency and wandering from the point in R.'s writings. With the exception perhaps of *Dominie Wus* and *Quintus Fizzlein*, his novels have little or no artistic form. His humour depends for its finest effects on a certain grotesqueness and eccentricity and a feeling for the incongruous.

His collected works were first pub. in 1826-38, and in a critical ed. by E. Berend, 1927-42, who also ed. his letters, 1922-6. See lives and studies by J. Alt, 1925; W. Harich, 1925; W. Meier, 1926; M. Kommerell (2nd ed.), 1939.

Richthofen, Ferdinand, Baron von (1833-1905), Ger. geographer, b. Karlsruhe. He travelled widely until 1872, exploring in particular Japan, Java, California, and China. His *magnum opus* was a comprehensive geographical, economic, and geological survey of the last-named country, a work which appeared between 1877 and 1912. From 1886 till his death he held the chair of geography at Berlin.

Richthofen, Manfred, Baron von (1882-1918), Ger. airman, b. Breslau. He was appointed commander of the 11th Chasing Squadron in Jan. 1917. His 'circus', or squadron, of planes was remarkable for the number of planes it brought down. R. received the Ordre Pour le Mérite in 1917, and later the Order of the Red Eagle with Crown and Swords. In his *Memoirs* (Aug. 1917) he speaks highly of the Brit. airman's fighting qualities, and he himself had a reputation for chivalry in air combats. The command of his squadron passed to Hermann Goering (q.v.) after R.'s death in battle over the W. front.

Richmer (d. 472), Suebian chief and general in the Rom. army. He twice defeated the Vandals in AD 456 and then dethroned the Rom. emperor Avitus, replacing him successively by Majorianus, Libius Severus (461), Anthemius (467), and Olybrius (472).

Rickets, or **Rachitis**, deficiency disease of infancy due to lack of the anti-rachitic vitamin D, and characterised by poor nutrition and improper development of bones. The new-born infant has acquired sufficient vitamin D from its mother during intra-uterine life to support it in normal health for the first few months of its separate existence. If after that time there is a deficiency of the vitamin in its diet symptoms of R. appear. Digestive disorders, loss of appetite, tenderness of the limbs, and profuse sweating are apparent. In R. there is a deficiency of calcium and phosphate in the blood, and this leads to defective calcification of the growing bones. Deformities such as bow-legs (q.v.) and knock-knee (q.v.) and spinal curvature appear. There is delay in the closure of the fontanelle of the skull, and also delay in dentition. Vitamin D, the anti-rachitic vitamin, is fat soluble and is found naturally in fish-liver oils such as cod, halibut, and tuna, and to a lesser

degree in butter and egg yolk. It is destroyed by heat. A synthetic vitamin D (or calciferol) is made by the irradiation of ergosterol with ultra-violet light. Owing to better standards of living, R. is now a rare disease. See VITAMINS.

Ricketts, Charles (1866-1931), painter, b. Geneva. In 1888 R. started the Vale Press, a series of octavo reprints for which he designed the type founts known as Vale, Avon, and King's, together with numerous engraved illustrations. R. also did a number of beautiful pen-drawings for different pubs., one of his best being 'Oedipus and the Sphinx.' He was elected A.R.A. in 1922 and R.A., 1928. His chief pictures in public galleries are 'The Death of Don Juan' (Tate Gallery), 'The Plague' (Luxembourg Collection, Paris), and 'Montezuma' (Manchester). R. was a connoisseur and collector of pictures, prints, and drawings, a stage designer and author as well as painter. He pub. *The Prado and its Masterpieces*, a book on Titian, and *Unrecorded Histories*, 1933. See memoir by T. S. Moore, 1933.

Ricketts, Howard Taylor (1871-1910), Amer. pathologist, b. at Findlay, Ohio, after whom are named the Rickettsia bodies living in lice and other arthropods, whence they may be transmitted to man and animals. *Rickettsia prowazeki* causes typhus fever; *R. psittaci* is responsible for psittacosis (q.v.) in parrots and occasionally in man. R. died of typhus contracted while studying the disease.

Rickmansworth, urb. dist. and tn of Herts, England, 4 m. WSW. of Watford, on the R. Colne, Gade, and Chess and the Grand Union Canal. It is primarily residential, but it has printing works and manufs. of paper, asbestos, and lorrys. Pop. 25,000.

Ricochet, name given to the rebounding from a flat surface, as of a stone from water, or cannon ball or bullet from ground or water; the motion commonly known as 'ducks and drakes.'

Riddell of **Walton Heath**, **George Allardice Riddell**, 1st Baron (1865-1934), Brit. newspaper proprietor, b. Brixton, London, son of a photographer. He became a solicitor, practising first at Cardiff, and afterwards in London. When Lascelles Carr founded the *Western Mail* R. became its editor; after this he became legal adviser to the *News of the World*; in 1903 he gave up the law and became chairman of the *News of the World* and also head of the firm founded by Sir George Newnes, to which latter organisation he added *Country Life* and *John O'London's Weekly*. Knighted in 1909, he played a prominent part in the settlement of the coal strike of 1912. He was appointed press representative at the Versailles peace conference in 1919, and in 1920 he was raised to the peerage. R. gave £100,000 to the Royal Free Hospital, of which he was president in 1925; also a similar sum to the Eastman Dental Clinic. He wrote *War Diary, 1914-18*, 1933, *Intimate Diary of the Peace Conference and After, 1918-23*, 1933, and *More Pages from my Diary, 1908-14* 1934.

Ridder, Herman (1851-1915), of New York, inventor with W. S. Scudder (1859-1932) of the Intertype (see TYPE-CASTING AND TYPE-SETTING MACHINES). The first machine was installed in the office of the *Journal of Commerce*, New York, early in 1913. A British company was formed in 1921.

Riddings, industrial par. in the Alfreton urb. dist., Derbyshire, England, 3 m. SSE. of Alfreton. It has coal mines, iron foundries, and factories manufacturing chemicals, floor blocks, and concrete products. Pop. 4400.

Riddle (Ger. *Rätsel*), paraphrastic presentation of an unmentioned subject, the design of which is to excite the reader or hearer to the discovery of the meaning hidden under a studied obscurity of expression. Anciently it was put to important uses, although in its inferior phase of conundrum it was a part of the intellectual entertainment at Gk., and afterwards at Rom., banquets. In the E. it naturally associated itself with symbolical modes of thought, and was also, as it still is, abundantly employed for didactic purposes. The so-called proverbs or sayings attributed to Solomon frequently assume the form of R.s. Every reader of the O.T. is familiar with the R. which Samson proposed to the Philistines, and the 'enigmas' (as the Septuagint has it) that the Queen of Sheba proposed to Solomon. The R. is found in the Koran, and sev. books of R.s exist in Arabic and Persian. It would appear that they were also known to the anc. Egyptians, while among the Greeks they were allied in the earliest times with the *oracula*, or mystic utterances of the inspired priests, and were generally in verse. Even the greater poets did not refuse to introduce the R. into their writings, and the R. of the Sphinx is probably the most celebrated in the whole circle of philosophical puzzles. Among the Romans professional R. makers did not make their appearance till the latest period of Rom. literature, the reason assigned for which is the superior gravity and earnestness of the Rom. genius. The R., more as an amusement than as a serious intellectual effort, was much cultivated during the Middle Ages. The Reformation checked the merry pastime of R.-making, but in the 17th cent. it came into favour again. The Abbé Cotin was a famous fabricator of R.s. In the 18th cent. the taste for the manuf. of R.s. continued to increase, and most of the brilliant Fr. *littérateurs* did a little in this line. In Germany Schiller gave a broader development to the R. In his hands it again became something grave and sibylline and attained a high degree of literary force. See also CHARADES.

Rideau Canal, in Ontario, Canada, connecting Ottawa with Kingston, on Lake Ontario, by way of the Rideau R. and lake, and by connections with the Mud Lake and Cataraqui R. The canal, built between 1826 and 1834, is 126½ m. long, and has a navigable depth of 4½ ft; it has greatly declined in importance since

the advent of railways. Rideau Hall, at Ottawa, is the residence of the governor-general.

Ridge, William Pett (c. 1860-1930), novelist, b. Chatham, near Canterbury. Educ. at Birkbeck Institution, he entered the Civil Service, but at the age of 30 became a journalist, and also wrote novels of lower-class London. Among his books are *Mord Em'ty*, 1898, *A Son of the State*, 1899, *A Breaker of Laws*, 1900, *Yerb*, 1903, *Name of Garland*, 1907, *Nine to Six-Thirty*, 1910, *The Amazing Years*, 1917, and *Rare Luck*, 1924. *A Story Teller: Forty Years in London*, 1923, and *I Like to Remember*, 1925, are reminiscences.

Ridge, prehistoric track along the Eng. Berkshire Downs from White Horse Hill to Streatley, S. of and parallel to the Icknield Way. See H. F. Timperley, *Ridge Way Country*, 1935.

Ridgway, Matthew Bunker (1895-), Amer. gen., b. Fort Monroe, Virginia. He graduated from West Point, 1917, and was later assigned to War Plans Division of the war dept general staff. In the Second World War he was assistant division commander and later commanding gen. of the 82nd Infantry Division; he retained command when this became the 82nd Airborne Division. In 1950 he was appointed commander of the U.S. 8th Army in Korea, and in 1951 he replaced Gen. Douglas MacArthur (q.v.) as commander of United Nations forces in Korea and of Allied occupation forces in Japan. In 1952 he replaced Dwight D. Eisenhower (q.v.) as supreme commander of the Allied Powers in Europe. In 1953 he was appointed Chief of Staff, U.S. Army. He wrote his memoirs, *Soldier*, 1956.

Riding, name of the 3 administrative divs. of Yorks, England. The old word, used in Scandinavia, was 'thrilling.'

Riding is practised in 4 different main systems: (1) ordinary R.; (2) rough R.; (3) military R.; (4) ladies' R. But of each system there is one general principle, that good horsemanship depends on balance, grip being left to exceptional moments of insecurity. The rider should always strive for a firm, natural seat and a well-braced back, and he should hold the reins fairly long to allow full freedom to the horse's head. In mounting a man should stand alongside the horse's near or left shoulder, with the reins in his left hand; the left foot is placed in the near stirrup held by the right hand, which is then placed on the cantle as far to the off-side as possible. In the spring as little weight as possible should be put on the stirrup; the right leg is swung over the animal's back and the rider sinks lightly into the saddle. Other recognised methods of mounting are from a mounting block; by being given a 'leg-up' by a second person; and by springing up unaided from the ground, leaning across the horse's withers, and swinging the right leg over. The feet should be placed well in the stirrup, not under the ball of the foot, since this throws the seat out of alignment, and a good rider naturally avoids putting his weight on the stirrups.

as he avoids hanging on to the reins. In learning to ride bare-backed, practice is invaluable, and as many different horses as possible should be practised on, beginning with a thoroughly trustworthy animal, so that the rider's actions become automatic. In ordinary R. the reins should be held in both hands, especially when using a double-bridle (see BRIDLE). Rough riders greatly depend for security of seat on the construction of their saddles. With the development of international competitions, such as the Olympic Games (q.v.), military R. has much improved in recent years. It is of a composite character, and calls for skill, adaptability, and very thorough training. Ladies' R., which is side-saddle R., has been almost completely replaced in popularity by the cross-saddle. This is to be regretted not only on account of the loss of elegance and tradition, but also because in many cases a woman can maintain a better balance, and greater control of her mount, when R. side-saddle. To mount, the rider holds the off-side of the saddle seat, with the reins in the right hand and the left hand on the top pommel. Then placing the left foot in the stirrup she straightens the knee and lightly steps into the saddle with a little twist. See also CAVALRY; FOX-HUNTING; HORSE-RACING; POLO; STEEPLECHASING. See W. Fawcett, *Elements of Horsemanship*, 1932, and *Riding and Horsemanship*, 1935; H. D. Chamberlain, *Riding and Schooling Horses*, 1935; J. Ellis, *Breaking and Riding*, 1937; S. Kournakoff, *School for Riding*, 1939; Maj. D. Marsh-Macmillan, *Equitation and Horsemanship*, 1948; E. Harrison, *Riding: a Guide for Beginners*, 1949; Lt.-Col. W. E. Lyon (ed.), *The Horseman's Year*, 1949.

Ridley, Henry Nicholas (1855-1956), botanist, b. Bishopstone, educ. at Haileybury and Oxford Univ. On graduating he joined the staff of the Brit. Museum botanical dept. In 1889 he was appointed director of the botanical gardens in the Straits Settlements, and there he found a plantation of *Hevea brasiliensis* grown from seedlings sent out from Kew in 1877 (see RUBBER, *History of Commercial Rubber Growing*). He began tapping experiments and was largely responsible for the estab. of the rubber industry in Malaya. In 1911 he retired from Singapore and went to live at Kew, working in the Herbarium there until the later years of his life. His writings were numerous, the best known being *Flora of the Malay Peninsula* (5 vols.), 1922-5, and *The Dispersal of Plants Throughout the World*, 1930. He d. shortly before his 101st birthday.

Ridley, Maurice Roy (1896-), scholar, b. Orcheston St Mary, Wilts. Educ. at Clifton and Balliol College, Oxford, where he won the Newdigate Prize for Poetry, he was a schoolmaster from 1914 to 1920, and from then till 1945 a Fellow of Balliol. His most important work is the New Temple ed. of Shakespeare's plays, 1934-6, which he followed with *Shakespeare's Plays, a Commentary*, 1937. Others of his books

are *Poetry and the Ordinary Reader*, 1930, *Keats's Craftsmanship*, 1933, and studies of Gertrude Bell, 1941, and Abraham Lincoln, 1944.

Ridley, Nicholas (c. 1500-55), prelate, b. in Northumberland and educ. at Pembroke Hall, Cambridge, where he first acquired an interest in the ideas of the religious reformers. He became chaplain to Archbishop Crammer (1537), chaplain to Henry VIII, canon of Canterbury (1541), and of Westminster (1545), and Bishop of Rochester (1547). He quickly became one of the leaders of the Reformed Church, took part in the first revision of the Prayer Book (1548), and succeeded Bonner as Bishop of London in



BISHOP RIDLEY

1550. R. was not an extreme reformer, and that Anglicanism retains so many of the usages of the medieval Church may be partly due to his moderating influence. On the death of Edward VI, R. supported Lady Jane Grey, but was arrested by Mary and sent to the Tower. In 1554 he was condemned for heresy, and burned at Oxford at the same time as Latimer (1555). See his *Life and Works*, ed. by H. Christmas, 1841, and J. C. Ryle, *Bishops Latimer and Ridley*, 1926.

Rieka, see RIJEKA.
Riel, Louis (1844-85), Canadian agitator, b. St Boniface, Manitoba, championed the cause of the Métis or half-breeds, to whom he belonged by reason of his Fr., Indian, and Irish descent. The first rebellion which he headed was in 1869. It arose out of the hostility of the settlers at Red River to the transfer of the NW. Territory from the Hudson's Bay Company to Canadian administration. In all the discussions preceding the transfer, the one group whose interests had not been consulted were the settlers already in the NW., who numbered about 10,000, the

most numerous of these being the Métis, who regarded themselves as pioneers of Fr.-Canadian settlement on the plains. The Métis feared they might lose their language and schools. In R., an inveterate enemy of the Canadian Gov. domination, they found a leader and decided to oppose the new regime. A 'provisional gov.' under R. was set up, but in the next year the dispute was compromised in the Manitoba Act, which granted a prov. gov. at Red River and recognised the right of the Fr.-speaking settlers to their language and schools. R. escaped, and in 1873 was elected to the dominion Parliament, but expelled and outlawed. Unbalanced in judgment and vain, qualities aggravated in 1884 when he headed the second rebellion of Métis, he was none the less shrewd and in some ways able. On the occasion of the second rebellion there was discontent among the Indians of the Saskatchewan region, as well as among the Métis. The latter were especially disaffected over the Ottawa Gov.'s failure to grant them titles to their farms, while the Indians brooded over their lost freedom. It was in these circumstances that messages were sent to R., and the rebellion broke out in Mar. 1884. The gov. of Ottawa was taken by surprise, but moved with alacrity. Troops were sent from Winnipeg to hold the new railway which had recently been completed from there to the mts. The rebellion ended almost as suddenly as it began. One main engagement lasting 3 days was fought at Batoche; the settlement was captured and R. surrendered a few days later and was executed. See G. W. Brown, *Building the Canadian Nation*, 1942; W. M. Davidson, *Louis Riel*, 1955 (rev.); Z. Hamilton, *These Are the Prairies*, 1950.

Riemann, George Friedrich Bernhard (1826-66), Ger. mathematician, b. Brese-lenz, Hanover. His earliest paper in 1850 was on functions of a complex variable, and later he wrote on elliptic functions, the theory of numbers, and the fundamental conceptions of geometry. He denied the axiom that 2 straight lines cannot enclose a space, and advanced proofs to show that observation cannot establish that space is strictly Euclidean. He attempted to show that it may be finite, though, like Euclidean space, unbounded. In his geometry every straight line would return into itself and be closed, just the same as a geodesic on a spherical surface. His system of non-Euclidean geometry is practically that of spherical space, that is, the surface of an ordinary sphere, and is described in his lecture, *On the Hypotheses which form the Foundation of Geometry*, 1854, which was published in 1867. Riemannian space and curvature tensors have been incorporated in Einstein's relativity theory and other modern cosmological theories.

Riemenschneider, Tilman (1460-1531), Ger. mason and sculptor, b. Osterode. He was one of the most outstanding of Ger. sculptors: he combined the tenderness of late Gothic styles with a sensuous-

ness that foreshadowed baroque; his work has a rare quality of plety and pathos, and is, at the same time, essentially spontaneous. The 'Madonna' in the cathedral at Würzburg, executed about 1503, and the marble tomb (1499-1513) of the emperor Henry II and his consort at Bamberg are among his great works. See lives by C. Streif, 1888; H. Schrader, 1927; F. Knapp, 1935; K. Gerstenberg, 1940; K. H. Stein, 1944.

Rienzi, Cola di (c. 1313-54), It. political reformer, b. Rome, the son of a tavern-keeper. His zeal for reform received an impetus from the murder of his brother by a noble. He became a notary of some importance, and in 1343 went on a mission to Pope Clement VI at Avignon. He gained the papal favour, and returned to Rome in 1344, and in May 1347 invited all the citizens to a meeting in the Capitol. The new laws he there proposed were at once adopted, and he was made tribune of the new republic. For a short time his rule was popular and successful, but his arrogance disgusted both his own people and foreign princes, and the nobles, with the consent of the Pope, drove him out of the city at the end of the year. He was restored by Innocent VI in Aug. 1354, but was killed by the mob in Oct. See Bulwer-Lytton, *Rienzi*, on which Wagner's opera was based. See also lives by P. Plar, 1931, and V. Fleischer, 1948.

Riesa, Ger. tn in the dist. of Dresden, on the Elbe, 25 m. NW. of Dresden (q.v.). It is a riv. port, and has manuf. of steel, chemicals, glass, tyres, and foodstuffs. Pop. 34,000.

Riesengebirge, mt chain, part of the Sudetic Mts (q.v.), lying between SW. Silesia and NE. Bohemia (qq.v.). The highest pt is Schneekoppe (5285 ft).

Rieti: 1. Prov. of Italy, in NE. Lazio (q.v.). It is mainly mountainous, and contains some high peaks of the Apennines (q.v.), but has the fertile valley of the Tiber (q.v.) in the W. There are sev. long, narrow lakes along the course of the R. Nera. Area 1085 sq. m. Pop. 179,000.

2. (anc. Reate) It. mkt tn, cap. of the prov. of R., 36 m. NNE. of Rome (q.v.). It was once the chief tn. of the Sabines (q.v.). There is a medieval cathedral, with a 13th-cent. campanile, a 13th-cent. episcopal palace, and some fine Renaissance buildings. Textiles and chemicals are manuf. Pop. (tn) 24,800; (com.) 37,300.

Rievaulx, or **Rivaulx**, Abbey, Cistercian foundation situated in the N. Riding of Yorks, 2½ m. NW. of Helmsley, dating from 1131, and now in ruins. The word means 'valley of the Rye' from a small riv. that flows by the ruins. There is a vil. of R.

Rif, Er Rif, or **Riff**, mountainous strip of coast in N. Morocco, stretching from Ceuta to Algeria. There are some 1,500,000 inhab. in the R. country.

Rifle. The main varieties of military R.s are described in the articles FIRE-ARMS and GUN; it is proposed therefore to deal with sporting R.s and also with shotguns in general in this article.

A sporting R. is a weapon designed for shooting game of various kinds. All modern R.s are of the breech-loading type, and fire a cartridge made up of 4 components: (a) a brass cartridge case which serves as a holder for the propellant powder and also as a gas seal preventing a flow of gas rearwards; (b) the propellant powder; (c) a priming cap; (d) the bullet. The barrel is rifled, i.e. there are spiral grooves to impart a high rotational velocity to the bullet to ensure that it maintains equilibrium in flight. The cartridge is supported in the breech of the barrel by a member known as the breech block, which usually contains the firing mechanism. The latter normally consists of a pin known as a striker, capable of indenting the cartridge. Pressure on the trigger actuates a piece known as the sear, which releases the striker or hammer, which is then thrown forward to fire the cartridge by means of a powerful spring which hitherto has been kept in a state of compression. The most popular types of bolt actions employed are those based on the Mauser system, and are identical in essentials to the Ger. military R. (Model 1898) action (see GUN).

The cartridges of European manuf. for hunting purposes which are most often met are as follows: 6.5 mm., 7 mm., .303 in., 7.9 mm., 9 mm., 9.3 mm., .375 in. H. and H. Magnum, and 10.75 mm. Another pattern of bolt action R. which achieved popularity between 1905 and 1939 was the Mannlicher-Schoenauer (particularly in .256 in. (6.5 mm.) calibre), manufactured in Austria. In the U.S.A. the bolt action R. is popular, but in many parts of the Continent, where hunting is carried out on horseback, the need for a good saddle R. is felt, and consequently the lever action R. is found more convenient. A multitude of similar cartridges are used for 'vermin' shooting, which has developed in recent years into a serious sport. Unquestionably the .22 in. rim-fire sporting R. is the most popular in all countries. Unlike the R.s hitherto mentioned, the cartridge utilised for this R. contains its priming in the base rim, and it is exploded by a blow from the striker on firing, hence the term 'rim-fire,' as opposed to 'centre-fire' cartridges containing a priming cap in the centre of the base of the cartridge. .22 in. rim-fire R.s are most effective on small vermin and rabbits up to 100 yds, and make excellent practice target weapons; ammunition is relatively cheap and plentiful.

R. sights fall into 3 basic categories: (a) open 'iron' sights; (b) aperture sights; (c) telescopic sights. Both 'iron' and aperture sights have a common type of foresight which consists of a projecting blade fixed to a ramp bed located on the end of the barrel. The open 'iron' back-sight consists of a raised piece of metal with a U or a V notch cut in the centre of it. Aim is then taken by getting the tip of the blade or the bed of the foresight in line with and in the centre of the shoulders of the U or the V of the back-sight; the height of the backsight can

usually be elevated or depressed for varying ranges. In the aperture rearsight, instead of a U or a V notch there is merely a ring in the centre of which the tip of the blade of the foresight must be located for an accurate aim. In the telescopic sight a graticule in the form of a cross is incorporated. When taking aim the intersection of the cross wires of the graticule is superimposed on the target.

Shotguns have changed little in the last 50 years; they can be divided into 4 main categories: (a) those with double barrels arranged side by side, or superimposed, known as 'over and under'; (b) single-barrel guns without magazines; (c) single-barrel guns with 3- or 5-shot magazines semi-automatic; (d) as (c) above, but the loading and ejection of cartridges is achieved manually by means of a pump action. The double barrel (side by side) is the most common Eng. shotgun, and is manufactured in 12, 16, 20, 28, and .410 in. bores, the 12 bore being most often encountered in the U.K. There is a variety of well-known action systems, such as Purdey, Holland & Holland, and Anson & Deeley.

See G. Burrard, *Notes on Sporting Rifles*, 1920, and *The Modern Shotgun*, 1932; E. Keith, *Big Game Rifles and Cartridges*, 1943; T. Whelen, *Small Arms, Ballistics and Design*, 1945; and C. S. Landis, *Twenty-two Calibre Varmint Rifles*, 1947.

See also FIREARMS.

Rifle-bird, or Rifleman-bird, bird of paradise known as *Ptiloris paradisea*. It occurs in Australia and New Guinea, and is purplish-black in colour with patches of green bronze. The Eng. name is said to have been given by settlers in Australia from the resemblance of the colour of the plumage to that of the uniform of the Rifle Brigade. The nest is usually made in a creeper tangle and is nearly always adorned with the cast skin of a snake.

Rifle Brigade, The, one of the most famous infantry regiments of the Brit. Army, raised in 1800 as the Rifle Corps, or Corps of Riflemen, and drawn from various line regiments. The regiment was numbered 95th Foot in 1802, but in 1816 was taken out of the numbered regiments of the line and redesignated the R. B. The riflemen were used, like the *Fir. tirailleurs*, to cover the front of the ordinary infantry by scouting and skirmishing. Hence their green uniform, for camouflage, and the bugle used to give commands, which forms a part of the badge of all rifle regiments. Three other battalions were added in 1805, 1855, and 1857, and until after the First World War the R. B. shared with the Royal Fusiliers, Middlesex Regiment, K.R.R.C., and the Worcester Regiment the distinction of being the only line regiments with 4 battalions, or more than 2. With so many battalions, the R. B.'s battle honours are necessarily numerous, including the battles of the Peninsular war, S. Africa (1846-7; 1851-3), the Crimean war, the Burmese war (1885-7), Khartoum, and the S. African war. In the First World War the R. B. was aug-

mented by numerous regular special reserve, service, and territorial battalions, including the Tower Hamlet Rifles. Various battalions of the R. B. figured in practically every important battle of the First World War, from Mons in 1914 to Valenciennes in 1918. They were especially conspicuous in the fighting of 1914 at Mons and Le Cateau; in 1915 at St Eloi; in 1916 at Beaumont-Hamel and at Guillemont; in 1917 at Ypres; and in 1918 at Villers-Bretonneux and Cambrai. In 1939-40 the R. B. fought in France, and was conspicuous at the defence of Calais. Converted to lorried infantry after Dunkirk, it fought in armoured divs. in the N. African and It. campaigns, and was among the units which landed in Normandy in June 1944, serving in NW. Europe until the Ger. collapse.

Rifle Shooting. The National Rifle Association (q.v.) meeting is held annually in July for a fortnight at the ranges on Bisley Common, Surrey. The competitions were formerly held at Wimbledon, but the introduction of the small-bore rifle rendered it necessary for the ranges to be longer and safer, and Bisley was therefore chosen in 1890. The competitions are for individual members and teams of the Brit. Commonwealth fighting forces and for civilian members of the National Rifle Association. The most important of the competitions are as follows: The Queen's Prize (formerly the King's Prize), which was founded by Queen Victoria in 1860, is of the value of £250, and carries with it the gold medal of the National Rifle Association. The competitors shoot 7 shots at each of 200, 500, and 600 yds; the best 300 are selected, who shoot 10 shots at each of 300, 500, and 600 yds; the best 100 of these shoot 15 shots at each of 900 and 1000 yds. In 1930 the King's Prize was won by a woman for the first time in the hist. of the competition, the winner being Miss Marjorie Elaine Foster of Frimley, Surrey. Other competitions open to subjects of H.M. the Queen are the St George's Prize and the Prince of Wales's Prize. There are various prizes for teams of riflemen—the Elcho Challenge Shield, for the best 4 'eights' of the different nationalities of the Brit. Is.; for this 15 shots at 800, 900, and 1000 yds are fired with the Match rifle. The Ashburton Challenge Shield is for the best 8 of public-school volunteer corps: 7 shots at 200 and 500 yds are fired; for the Humphrey Challenge Cup for Match rifle open to univ. teams, 15 shots at 900 and 1000 yds. Teams from the mother country and the Dominions and Colonies compete for the Kollapere Cup, firing 10 shots at 300, 500, and 600 yds with Service rifle. The experience gained in the field during the First World War confirmed the opinion that the rifle was the chief weapon of the Infantry and Cavalry and that efficiency in its use was essential to success. Light and medium machine-guns are regarded as powerful auxiliaries, and the degree of assistance they render the other arms is relative to their efficient tactical applica-

tion. To develop this aspect of small-arm training, special competitions at Bisley were included in the programmes. The competitions were discontinued during the Second World War, and resumed in 1946. There are still special competitions for units of all Services, including Dominion Services.

Rift Valley, geological structure formed by the sinking of a strip of land between two parallel faults. The E. African lakes and the Dead Sea occupy parts of the African R. V. system which is one of the major topographical features of the earth. The Rhine valley is another example, lying between the Vosges Mts to the W. and the Black Forest granites to the E.

Riga, cap., econ. and cultural centre of the Latvian Rep., an important industrial and cultural centre of the Soviet Union. It is situated on the W. Dvina near its mouth. There are varied engineering (electrical, transport, agricultural equipment), chemical, light, food, and wood-working industries. It is an important transportation centre: Baltic Sea port (second in the U.S.S.R.), 6 railway lines. It has the Latvian Academy of Sciences (founded 1946, library founded 1924), a univ. (1919, founded as Polytechnical Institute, 1861), and an historical museum (founded 1834). There are many churches and other historical buildings of 13th-19th cent. in the Old Town. The tn also has a famous seaside resorts area, Rīgas Jūrmala. Pop. (1956) 585,000 (14th in Soviet Union; c. 1914, 530,000, 1935, 385,000), mostly Latvians and Russians (before 1940 Latvians and Germans). Founded 1201 by Bishop Albert, the founder of the Order of Brothers of the Sword, it enjoyed far-reaching autonomy under the Livonian Order and was a member of the Hanseatic League (q.v.) from 1282. After the break-up of Livonia in 1561 it became an independent city-republic, then it was Polish from 1582, Swedish from 1621; it was conquered by Peter the Great in 1710 and ceded to Russia in the peace treaty of Nystad, 1721; it was cap. of the prov. of Livland; occupied by Germans 1917-18 and 1941-3. Cap. of independent Latvia 1918-40; cap. of R. Oblast in the Latvian Rep. 1952-3 (abolished). Peace treaties between Soviet Russia and Latvia (1920) and Soviet Russia and Poland (1921) were signed in Riga.

Riga, Gulf of, in the E. coast of the Baltic Sea, S. of the Gulf of Finland, separated from the Sea by Saaremaa Is. It is 100 m. long and 60 m. broad at its widest. The greatest depth is 22 fathoms; it is frozen for about 120 days in the year. The W. Dvina flows into it past the port of Riga.

Rigadoon, Fr. folk dance of Dauphiné. In ancient times it was used as a ceremonial dance in the Corpus Christi procession of Aix-en-Provence. To-day its ritual association remains in that it is danced after the corn has been threshed, as a simple circle dance for men and women. During the 18th cent. the R. became a popular social dance in France and England, of an

entirely different character. In quick 2/4 or 4/4 time, it was normally performed by a single couple, and contained complicated figures, in line with similar social dances of the period. A feature was the peculiar so-called 'rigadoon step,' which appears to have vanished along with this aristocratic version.

Rigaud, Hyacinthe (1659-1743), Fr. portrait painter, b. Perpignan, entered the École des Beaux Arts in Paris in 1681. At Le Brun's suggestion he studied in Rome, and formed his style on that of Van Dyck. A diligent worker and a careful artist, he counted Louis XIV, Le Brun, Boileau, Boissuet, and Charles XII of Sweden among his sitters. 'Marie Serre' (his mother) is perhaps his masterpiece. See life by J. Roman, 1919.

Rigel, or β Orionis, seventh brightest star, its magnitude being 0.3. Its distance is about 600 light-years, and its luminosity is 17,000 times that of the sun. Its spectrum shows it to be of the helium type and a short-period binary of 22 days. It also shows that it belongs to the B8 class, in which hydrogen lines are prominent, but the helium lines, observed in great intensity in class B2, have nearly faded out. Stars of this type have temps. of about 20,000° C. R. has a companion distant 9.6" of mag. 8, which is itself a double star.

Rigging, see SAILS AND RIGGING; YACHTS.

Right, see RIGI.

Right, Petition of, see PETITION OF RIGHT.

Right Ascension (in astronomy), see ASCENSION, RIGHT.

Right-handedness, disposition common to the greater part of mankind, to use the right hand for more complex manipulatory actions rather than the left. No very satisfactory explanation has been offered of this phenomenon. Some have maintained that R. originated in the asymmetry of the body, the larger size of the right lung providing for more exertion; others have suggested that the necessity for shielding the heart determined that the right should be the sword arm. It is, at any rate, easy to understand that one hand should be used more than the other. In estimating direction in a straight line from the observer, 2 eyes are a disadvantage. If the finger be pointed at an object with both eyes open, and if then each eye be shut in turn, it will be found that the direction of the extended finger is right for 1 eye only, usually the right. If the right eye is thus trained to indicate direction, it naturally follows that the right hand is more often used in throwing, striking, etc.

Right of Way, right which a person or body of persons has of passing over another's lands. It is in the nature of a privilege or convenience and not a profit (see also EASEMENTS; INCORPORATED CHATELLE; HEREDITARY; LAND LAWS; PRESCRIPTION). A R. of W. by necessity arises where A grants (see GRANT) a piece of land to B surrounded by other land of A's; for if a R. of W. were not implied B

could never get to the land bought from A. Public R.s of W. usually arise either by express grant or by prescription. See also FOOTPATHS.

Right Opposition (or Right Deviation), in Communist parties and in the Communist International, opposition to the policy of the dominant group by the more moderate elements, i.e. those stressing the need for compromise and co-operation with non-Communists. In Russia the main R. O., led by Bukharin, Rykov, and Tomskiy 1929-30, advocated a more conciliatory policy towards the peasants. See F. Borkenau, *The Communist International*, 1938; I. Deutscher, *Stalin*, 1949.

Right-whale (Balænidæ), family of whales, characterised by the large head and mouth, long plates of whalebone being attached to the palate, and by the absence of the dorsal fin (except in *Neobalaena*) and grooving on the throat. The Greenland or R. (*B. mysticetus*) is the best-known Cetacean, and was long supposed to be of world-wide distribution. Other species have, however, been identified, including the S. or Cape whale (*Eubalaena australis*). The name comes from the fact that the old-time whalers were only able to hunt the R.s; they were the 'right' whales to be pursued.

Rights, Declaration and Bill of, see BILL OF RIGHTS.

Rigi, or **Righi**, mt of Switzerland, rising between the lakes of Luzern and Zug. Altitude 5906 ft. Its popularity with tourists is due to the fine view it commands. The summit may be reached by a railway from Vitznau, on the S., or by one from Arth, on the E.

Rigidity, see ELASTICITY AND STRENGTH OF MATERIALS.

Rigor, sensation of chill accompanied by shivering, which is characteristic of the initial stage of many feverish conditions. Notwithstanding the feeling of intense cold, the actual body temp. is higher than normal, and the sensation is due to a disturbance of the cutaneous heat-regulating mechanism, the surface capillaries being for the time constricted. This is generally accompanied by internal congestion, and the cold sensation is followed by a feeling of heat as the blood temp. gradually rises. In most forms of malaria there is a regular succession of cold and hot fits.

Rigor Mortis, see DEATH.

Rig Veda, see VEDA AND VEDISM.

Rijeka (or **Rieka**; It. **Fiume**), seaport in Croatia, Yugoslavia, on the R. Rijetina, at the head of the bay of Kvarner (q.v.). It is the largest Yugoslav port on the Adriatic, and is the cultural and economic centre of Istria (q.v.) and the Croatian coast.

R. became part of the Empire in 1471. In the 16th cent. it played an important part in the cultural development of Croatia. In the 18th cent. it was a free port, and, after various vicissitudes in the Napoleonic wars and their aftermath, it was joined to Hungary in 1870. The Hungarian Gov. encouraged the It. inhab. of the tn (who were greatly in the majority

except in the E. suburb of Sušak) in their desire to maintain their predominance over the Slav inhab. The secret treaty of London (q.v.) in 1915 excepted R. from the terms which were to be granted to Italy as the price of her participation in the First World War. This omission was opposed by the Irredentists, and at the end of the war R. was claimed by both Italy and Yugoslavia (then called the kingdom of the Serbs, Croats, and Slovenes). In Sept. 1919 a small irregular force under Gabriele d'Annunzio (q.v.) seized the tn on behalf of Italy—a venture which influenced Mussolini and Farinacci (qq.v.) in the 'march' on Rome. In 1920 by the treaty of Rapallo (q.v.) R. was declared an independent free port (see SFORZA, COUNT CARLO). This was distasteful to the Italians, and, after continuing serious disorders, the tn and a small surrounding dist. were eventually given to Italy in 1924, Sušak being left to Yugoslavia as a port. After the Second World War R. was among the former It. possessions ceded to Yugoslavia by the peace treaty of 1947.

The newer parts of the tn are built at the foot of a hill, but the anc. parts are on the hill slopes. The tn is It. in appearance, and has a Baroque cathedral, a 13th-cent. castle, many old churches, and a triumphal arch supposed to have been erected in honour of Claudius II. It has an airport, railway connections with Italy, Trieste, and Hungary, and a deep and busy harbour. The prin. manufs. are machinery, olive-oil, tobacco, and textiles; there are also shipbuilding yards, and a large trade in timber. Pop. 75,100. See S. Gigante, *Storia del comune di Fiume*, 1929.

Rijssel, see LILLE.

Rijswijk (Ryswick), tn in the prov. of S. Holland, Netherlands, 2 m. SE. of The Hague. In the castle the treaty between England, the Netherlands, Spain, France, and the Ger. Empire was signed in 1697, which put an end to the war between France and the other signatories. France gave up all tns and dists. seized since the treaty of Nijmegen in 1679, retaining only Strasbourg, and undertook to recognise William III as King of England, promising to give no further aid to James II. Thus Spain recovered Catalonia and Mons, Luxembourg, and Courtrai, while the duchy of Lorraine went to Leopold Joseph, and the Dutch regarrisoned Namur and Ypres. Pop. 25,255.

Riley, Charles Valentine (1843-85), Amer. entomologist, b. London and educ. at Dieppe and Bonn. He went to the U.S.A. in 1860. He became state entomologist in Missouri, and his activities during the locust plague of 1870, when he correctly forecast the date on which the plague would end, brought him into prominence. He went before Congress and secured an appropriation for a commission of entomology to deal with future problems of this nature. R. also investigated the problem of the phylloxera insect which was causing great destruc-

tion to Fr. grapes. In 1878 he became entomologist to the newly formed Dept of Agriculture at Washington. He dealt successfully with the citrus scale which had attacked the Californian orange-groves; but a change of president found him out of favour with the administration, and R. resigned, continuing his research work privately. R.'s fine scholarship was combined with a spirit of enterprise and an infectious enthusiasm: his efforts ensured federal and state recognition of the value of the entomologist in preventing famine and hunger and increasing agric. production.

Riley, James Whitcomb (1853-1916), Amer. dialect-poet, b. Greenfield, Indiana, son of Reuben A. Riley, a lawyer. Disliking law, he became an itinerant sign-painter, actor, and mimic entertainer. He worked on the Indianapolis *Journal* from 1873, writing verses for it, chiefly in Hoosier or Indiana dialect. *The Old Swimm'-Hole and 'Leven More Poems*, 'by Benj. F. Johnson, of Boone,' 1883, was his first book. Others are *After-whiles*, 1887, *Rhymes of Childhood*, 1890, *Poems Here at Home*, 1893, and *Home Folks*, 1900. Perhaps the most widely popular of his poems (which are nearly all short) is 'Little Orphan Annie,' 1886. See M. Dickey, *The Youth of James Whitcomb Riley*, 1919, and *The Maturity of James Whitcomb Riley*, 1922.

Rilke, Rainer Maria (1875-1926), Ger. poet, b. Prague. He was educ. at the military academies of St Pölten and Weiskirchen, but then decided to adopt a literary career. He studied literature and the hist. of art in Munich and Berlin, and visited Russia. R. travelled a great deal in Europe, living for some time in Paris, where he was Rodin's secretary. He spent the last 7 years of his life in Switzerland. R.'s position in literature is somewhat isolated; his closest affinities probably lay with the Dan. mystic-romantics and the Fr. symbolists, and it was in France that he gained the greatest hearing and spent his happiest years.

His first collection of poems, *Leben und Lieder*, 1894, are generally conventional and show few signs of his latent genius. In *Advent*, 1898, and *Mir zur Feier*, 1899, he moved further towards a depersonalised idiom in an attempt to arrive at a standpoint of complete objectivity and realism. When he fully achieves this, as in many of the *Neue Gedichte*, 1907-8, *Duineser Elegien*, 1923, and the *Sonnete an Orpheus*, 1923, the intense, all pervasive spirituality of his poetry has few rivals. His apparent ability to detach himself from the universe in order to see, as a spectator, the greatness of God and puniness of Man, and from these to understand and convey eternal, fundamental truths, is unique. He tried to sublimate everything in his poetry to the central theme of man's struggle for spiritual vision and clarity. His own religious crises and triumphs became symbolic of the struggle, death, and regeneration of mankind. Besides the works men-

tioned above, other notable pubs. of R. include *Buch der Bilder*, 1903, and his greatest prose work, *Die Aufzeichnungen der Malte Laurids Brigge*, 1909.

His collected works were pub. in 1927, his *Letters* (ed. and trans. by R. F. C. Hull) in 1948, and his *Poems 1906 to 1926* (trans. by J. B. Leisham) in 1957. See F. Olivero, *R. M. Rilke*, 1929; F. Gundolf, *R. M. Rilke*, 1936; E. M. Butler, *R. M. Rilke*, 1946; N. Wydenbruck, *Rilke, Man and Poet*, 1949. See also E. Jaloux, P. Valéry, and others, *Rilke et la France*, 1942.

Rimbaud, Jean Arthur (1854-91), Fr. poet, b. Charleville in the Ardennes.

W. Fowle, 1946; also P. Verlaine, *Les Poètes maudits*, 1884; M. Raymond, *De Baudelaire au surréalisme*, 1933; Enid Starkie, *Rimbaud in Abyssinia*, 1937; Marguerite Y. Méléra, *Résonances autour de Rimbaud*, 1946; C. A. Hackett, *Rimbaud*, 1957.

Rime, deposits of white ice crystals, similar to hoar frost, on the windward side of objects by a wet (super-cooled) fog at temps. below freezing. This is soft R.; hard R. is when the ice is formed so quickly that solid clear ice is formed so windward; it may extend for sev. in. Hard R. is distinguished from glazed frost in that it is formed in fog or drizzle

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RIMINI AND THE MARECCHIA CANAL

F.N.A.

As a boy he displayed extraordinary talent, and, having run away from home 3 times, his poem *Le Bateau ivre* won him the friendship of the poet Verlaine. Subsequently he lived an adventurous life as tramp, soldier, and merchant by turns. While he was living in Abyssinia, his friend Verlaine, believing him to be dead, pub. his poems under the title of *Les Illuminations*, 1886. These took Paris by storm and originated the 'decadent' movement, and from R. stem also the *Symbolistes* and the surrealists. A further vol. of his poems, *Reliquaire*, was pub. in 1891. His complete works were pub. by the *Mercur de France* (2nd ed.), 1898. R.'s influence on Fr. art and literature was immense. See lives and studies by P. Berrichon, 1912; H. Jacob, 1921; J. M. Carré, 1924; R. de Rénéville, 1929; E. Y. Gauchère, 1936; J. Rivière (2nd ed.), 1938; Enid Starkie, 1938, 1947;

with wind, whereas glazed frost occurs on all surfaces, and accumulates round twigs or telegraph wires when super-cooled rain falls.

Rime, see RHYME.

Rime Giant, see YMIR.

Rimini, Francesca da, see FRANCESCA DA RIMINI.

Rimini (anc. Ariminum), It. city and seaside resort, in Emilia-Romagna (q.v.), 28 m. SE. of Forlì (q.v.). It is on the Adriatic, at the mouth of the Marecchia R., which is here canalised. Originally Umbrian, R. was later in the hands of the Etruscans (see ETRURIA) and the Senones (q.v.). In 268 BC it became a Rom. colony. Under the Romans it was a port of importance, and was the junction of the Flaminian Way, the Aemilian Way (qq.v.), and the Popilian Way (to Venice). It was then possessed successively by the Byzantines (see BYZANTIUM), the Goths,

the Longobards, and the Franks (q.v.). In 1239 it came under the rule of the Malatesta (q.v.) family, who held it for 3 cents. In 1503 it was sold to the Venetians, and from 1528 to 1860 it was under papal authority. During the Second World War it formed the E. end of the Germans' 'Gothic Line,' but fell to the Brit. Eighth Army on 22 Sept. 1944 (see ITALIAN FRONT, SECOND WORLD WAR CAMPAIGNS ON). There was very severe damage from bombs and shells, but there has been much reconstruction since the end of the war. Among the Rom. remains in the tn are a triumphal arch of Augustus (27 bc) and a bridge of Augustus. The cathedral, or *Tempio Malatestiano*, is one of the greatest of Renaissance monuments. It was originally late 13th-cent. Franciscan church, and was remodelled in 1450 by Leone Battista Alberti (q.v.) for Sigismondo Malatesta. It is rich in beautiful sculptures and frescoes, and contains many famous tombs of the Malatestas and their courtiers; the considerable war damage has been repaired. R. also has other fine churches, a 13th-cent. *palazzo*, and the remains of a 15th-cent. castle, as well as an art gallery, library, and museums. The modern part of the tn is laid out on spacious lines, and there is a splendid beach. There are silk, iron, sailcloth, sulphur, and fishing industries. Pop. (tn) 36,100; (com.) 76,900.

Rimmon, or **Ramman**, the Assyrian thunder god (2 Kings v. 18). Naaman excuses himself if as a 'captain of the host of the King of Syria' he worships in the temple of R. at Damascus. R. is identified with Hadad, the national god of Syria, in the inscriptions which mention Hadad as his name 'in the west,' cf. Benhadad.

Rimouski, tn of Quebec, Canada, 180 m. E. of Quebec. There are saw-mills, peat mines, and a cod-liver oil refinery; the tn has an agric. college and a marine school, and is the seat of a Rom. Catholic bishopric. Pop. 14,320.

Rimsky-Korsakov, Nikolai Andreievich (1844-1908), Russian composer, b. Tikhvin, near Novgorod. His youthful promise in music led to nothing until he joined the nationalist school with Balakirev, Cui, Mussorgski, and Borodin. His first Symphony (1865, St Petersburg) was a landmark in the hist. of Russian music. Retiring from the navy, R. now gave his whole efforts to music, becoming a prof. at St Petersburg Conservatory (1871), director of the Free School concerts (1874-81), and conductor of the Russian symphony concerts (1886-1900). His first opera, *The Maid of Pekon*, appeared in 1873; then came a period of study, followed by another opera, *A Night in May*, 1880. Other operas filled with his racy music, colour, and imagination are *The Snow Maiden*, 1882, *Madama*, 1892, *Christmas Eve*, 1895, *Sadko*, 1898, *The Tsar's Bride*, 1899, *Tsar Saltan*, 1900, *The Legend of Kitezh*, 1907, *The Golden Cockerel*, 1907. He left also 3 symphonies, a piano concerto, and a considerable quantity of orchestral and in-

strumental music, some songs, and some church music. See his *My Musical Life*, 1923; *Principles of Orchestration*, *Practical Manual of Harmony*, 1930; also life by M. Montagu-Nathan, 1916.



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RIMSKY-KORSAKOV

Rimur (plural of *ríma*), a peculiarly Icelandic type of narrative poetry, generally a metrical version of a prose tale or a saga. Occasionally it may be satirical, as in Jón Sigurdsson's celebrated *Tímarríma* (composed soon after 1700), or mock-heroic, as in Guðmundur Guðmundsson's inimitable *Alþingirímur* (1902), good-humouredly poking fun at the Althing (q.v.).

A cycle of R. consists of an indefinite number of cantos, and a canto (*ríma*) of an indefinite number of stanzas, from 15 upwards. The longest single *ríma* so far pub., Snæbjörn Jónsson's *Skúlaflötinn*, 1949, is formed of 960 quatrains. In each *ríma* all the stanzas must be on the same metrical pattern, and each pattern has a specific name. A very popular one, *hringhenda* (circular metre), is thus exemplified in Eng.:

She is *fine* as morn in May,
meek, divine and clever,
like a *shining* summer day,
she is *mine* for ever.

The most satisfactory manual on the subject is *Bragfræði* (Metrical Rules) by Sveinbjörn Hentelsson (b. 1924), the foremost of living R. poets.

We do not know exactly at what date R. were first composed; the oldest extant specimen is preserved in *Flateyjarbók* (q.v.) and is dated by scholars about 1350. But they very soon became popular above any other form of poetry. After 1870 they fell into disfavour, but interest is now reviving.

possessed a currency value, especially when they were made of gold or silver. They are characteristic of many early civilisations, including those of the Near E.; in Europe they have been found in France and (in considerable numbers) in the Brit. Isles, and especially Ireland, being attributed to the Early Bronze Age culture of W. Europe.

Ring Ousel, mt song-bird, *Turdus torquatus*, with brownish-black plumage, and a broad white patch on the throat. It nests in heather or on banks in moorland dists. The R. O. belongs to the thrush family and is a summer visitor to the Brit. Is. and Europe generally.

Ring-tailed Eagle, golden eagle in its early plumage (from 1 to 2 years of age).

Ringbones, bony enlargements on the large and small pastern bones of the horse, sometimes due to an injury and sometimes to rheumatic tendencies. 'False' R. do not involve the joints and, as a rule, cause lameness only when forming; but high R. at the pastern joint and low R. in the hoof (around the coffin joint) cause permanent lameness of varying degrees, which may, however, often be limited by suitable shoeing.

Ringerike, see VIKING ART.

Ringing the Changes, larceny (q.v.) by the trick, when giving or receiving change, of pretending that the amount put down was greater than actually was the case, or that sufficient change has not been given.

Ringkøbing: 1. Largest amt of Denmark, in W. Jutland. There is dairy farming, but the soil is generally sandy and poor, except along the Lim Fjord in the N. of the dist. Area 1800 sq. m.; pop. 198,400.

2. Cap. of the above, fishing port on R. Fjord, 73 m. W. of Aarhus. It has often suffered from floods. Pop. 4700.

Ringling Brothers, see CIRCUS.

Rings, FAIRY, see FAIRY RINGS.

Ringwood, mkt tn and par. of Hants, England, on the R. Avon, 12 m. NNE. of Bournemouth, and on the W. edge of the New Forest. It is noted for its fishing. Pop. of par. 7000.

Ringworm, or *Tinea*, contagious skin disease due to infection with the parasitic vegetable fungi *Microsporon audouinii* and *Trichophyton*. Most fungus infections invade only the epidermis, the nails, and the hair. They cause little disability, but because of their prevalence and their contagiousness they cause social problems. *Tinea pedis*, sometimes called 'athlete's foot', occurs either on the soles of the feet, where it appears as irritating, pinhead size vesicles, or between the toes, where it appears as thick, white, sodden-looking scales. Secondary infection may occur. *Tinea pedis* is contracted and spread from walking barefoot on the floors of dressing-rooms, bathing-places, bedrooms, etc., and the spores deposited on the ground are extremely resistant to destruction. Thus it is prevalent in communities such as schools, barracks, etc. The problem of cure is largely the problem of prevent-

ing reinfection from resistant spores either dormant in the skin or in socks and shoes. Perspiration of the feet, by making the skin moist, encourages a recurrence of infection. An essential part of treatment therefore is to sterilise socks and slippers and to avoid foot perspiration. *Tinea unguinum*. In this condition the fungus grows actually in the substance of the nail. The part of the nail nearest the free edge becomes discoloured yellow or orange, brittle and furrowed, and breaks easily. Because of its unsightliness and because it is a reservoir of infection for other parts of the skin, it is important to cure the condition whenever possible. However, owing to the fungus being enclosed within its horny habitation its eradication is not usually possible with external applications. The whole nail may have to be removed. *Tinea cruris*, sometimes known as 'dubie itch' from its prevalence in the tropics and from being contracted from clothing infected during laundering, starts as a bright red, itchy, scaly patch on the inner side of the thigh. The patch tends to clear spontaneously in the middle, thus giving the typical 'ring' appearance. *Tinea cruris* responds well to treatment by applications. *Tinea versicolor*. This form of fungus infection causes little irritation and is often disregarded by the patient. Patches of a light brown colour appearing on the front and back of the trunk are the only signs. It responds well to treatment. *Tinea tonsurans*. This type of ringworm of the scalp nearly always affects children, especially boys, between the ages of 5 and 10. It is rarely seen in adults. The easily seen, scaly patches are not truly bald, and when looked at closely the hairs are seen to be broken off, leaving the area covered with stumps. In this way *tinea* of the scalp may be distinguished from alopecia (q.v.). Scalp ringworm can be diagnosed by looking at it in the dark under the illumination of an ultra-violet light screened with Wood's glass (Wood's lamp). In this light the affected hairs shine with a green fluorescence. Treatment of *tinea tonsurans* presents a problem similar to that of ringworm of the nails, because the fungus grows within the hair shaft, which protects it. The only successful treatment is X-ray depilation, followed by application to the bald patch of ointment of a kind lethal to the fungus. Following X-rays, the hair falls out in about 14 days and begins to grow again after another 4-5 weeks.

Rintelen, Franz von Kleist (1883-1949), Ger. saboteur. He entered the Ger. Navy, and had a post on the naval war staff at Berlin in 1914. In 1915 he was sent to the U.S.A. as a spy. His organisation in New York smuggled bombs, which were detonated by the action of acid, on board munition ships, a scheme which caused many losses at sea. When returning to Germany he was taken from the Holland-America liner by the Brit. Naval Intelligence, and later extradited to America and sentenced to 4 years' imprisonment for sabotage. In 1933 he related his adventures in *The Dark In-*

vader, which became a best-seller. R. lectured in the U.S.A. and in England, and finally settled in London.

Rio Branco, riv. in N. Brazil, formed by sev. headstreams rising on slopes of Serra Pacaraima, flows 350 m. S. to join Rio Negro above Moura.

Rio Branco, state of N. Brazil created in 1943. Boa Vista, the cap., previously belonged to Amazonas state. It. B. is crossed in the S. by a riv. of the same name; both are called after a famous 19th-cent. Brazilian statesman who determined many of the boundaries of these regions, and gained fame for his country in the realm of international law. Area 82,749 sq. m.; pop. 18,116.

remarkable for the beauty of its position. The conical Sugar Loaf Mt., 1296 ft high, ascended by an aerial cableway, stands at the harbour entrance, and Corcovado, 2310 ft, rises from among the buildings of the city. It. is separated from the State of Rio de Janeiro, and constitutes an independent municipality, with an area of 524 sq. m., divided into 19 pars. This is called the Federal Dist., and is governed by a prefect. Parts of the city have been remodelled, the E. end reconstructed, and Morro do Castelo levelled, the soil being used to reclaim Saco da Glória and make land for the Santos Dumont airfield. A number of skyscrapers on the Amer. model have been



PART OF RIO DE JANEIRO (Courtesy of Brazilian Government Trade Bureau)

Rio Colorado: 1. Riv. of Argentina, forms the N. limit of Patagonia, and flows from the Andes ESE. into the Atlantic S. of Bahía Blanca. It is an agric., fruit, and wine-making area.

2. Tn of the same name on the above riv., 100 m. W. of Bahía Blanca. Pop. 3300.

Rio Cuarto, garrison tn of Córdoba prov., Argentina, 360 m. NW. of Buenos Aires, and 140 m. S. of Córdoba. Cap. of a dept. of the same name. R. C. is a bishopric and a rail centre, and has an airfield. Agriculture, dairying, milling, meat-packing, and light industry are carried on. Pop. 49,190.

Rio de Janeiro: 1. Cap. of Brazil and one of the prin. seaports of S. America, is situated on the W. side of one of the finest natural harbours in the world, which measures 15 m. by from 2 to 7 m. It occupies a narrow strip of alluvial land between the mts and the sea, being

erected. The setting of the tn between mt and sea forms an extremely attractive sight. A beautiful promenade of marble, 5 m. long, lines the waterside. The old streets are narrow, the chief of these being the Rua Direita or Rua Primeiro de Março, and the Rua Ouvidor. The Avenida Rio Branco is spacious and lined with beautiful buildings, including the gov. buildings, the library, art school, supreme court, and municipal theatre. Rio is the seat of an archbishop, who is generally a cardinal. The churches and monastic buildings, which number over 50, are extremely ornate, and mostly built in the Jesuit style; the Candelária (built 17th cent.) and Glória are the 2 most conspicuously situated. The public buildings include the monastery of São Bento, the hospital of Dom Pedro II (built 1841), a lunatic asylum (founded 1841), and a military hospital. Among the literary and scientific institutions are

the College Pedro II; National Museum; Institute of Hist., Geography, and Ethnology; Military and Naval School; Lyceum of Arts; an Astronomical and Meteorological Observatory; and National Library. There are also magnificent botanic and zoological gardens. The univ. was founded in 1920. In it are incorporated the School of Fine Arts and the National Institute of Music. There are sev. engineering and mining polytechnics in the univ. The Oswaldo Cruz Institute is devoted to experimental medicine. R. is one of the healthiest cities of the tropics, though in the sultry summer season about Christmas the gov. depts are moved to Petropolis in the neighbouring hills. It is well served by rail, by steamship lines, by air services, and, locally, by trams and buses. The water supply, which is very abundant, is carried along elaborate aqueducts over a distance of 12 m. The bay, at the entrance (about 1 m. wide) of which are the Fort S. João and Fort Santa Cruz, provides a safe anchorage of 50 sq. m. Industries include brewing, sugar refining, and flour milling, and there is an extensive trade in coffee, sugar, hides, diamonds, tobacco, timber, etc. Rio is the seat of the prin. arsenal of the republic. It was discovered on 1 Jan. 1502 by Goncalo Coelho, the Portuguese navigator. Some Fr. colonists were the first settlers in the neighbourhood (1555). The Portuguese took possession of it in 1567, and in 1808 the Portuguese royal family resided there. Pop. over 2,300,000.

2. Coastal prov., the cap. of which is Niterói, with an area of 26,627 sq. m., mountainous in the centre. It is the chief prov. of Brazil, and its forests are rich in timber. Its soil, which is rich and fertile, is very extensively cultivated, the chief crop being coffee. It has a naval school and an arsenal. There is a naval dockyard at the Ilha das Cobras. Area 16,443 sq. m. Pop. 2,297,200. See VOLTA REDONDA.

Rio de Janeiro, Treaty of (1947), for the mutual defence of the Americas, signed on 2 Sept. at Rio de Janeiro. It opens with a condemnation of war by the high contracting parties and a pledge not to resort to force in any manner inconsistent with the charter of the United Nations or the treaty itself. The parties undertake to endeavour to settle such controversies as may arise between them before referring them to the General Assembly or the Security Council of the United Nations. The vital Article 3 registers agreement that an armed attack by any state against an Amer. state shall be considered an attack against all the Amer. states. Each party undertakes to assist in meeting the attack. On the request of the state or states attacked and pending the decision of the 'Organ of Consultation,' each party may determine the measures which it should itself adopt to fulfil this obligation. This article applies when the attack takes place within the ter. of an Amer. state or within a region bounded in the way specified.

These boundaries completely enclose the Amer. continent, including Canada, Greenland, and Antarctica. Canada is not a member of the Pan-Amer. Union, a signatory of the Act of Chapultepec, or a signatory of this treaty. Greenland is Dan. ter.; in 1951 the U.S.A. negotiated with Denmark an agreement concerning its defence by N.A.T.O. If the integrity, sovereignty, or independence of any Amer. state should be affected by aggression not amounting to armed attack or by any situation that might endanger the peace of America, the Organ of Consultation shall meet at once to agree on the measures to be taken. This body is formed by the ministers of foreign affairs of the republics which have ratified the treaty, but the governing board of the Pan-Amer. Union may act provisionally pending the meeting of the Organ of Consultation. The treaty remains in force indefinitely, but may be denounced by any contracting party by notification to the Pan-Amer. Union, and ceases to be in force in respect of that state 2 years after the notification has been received.

Rio de la Plata, see PLATA.

Rio de Oro and Adrar, N. African colonial possessions of Spain, stretch S. along the coast from Cape Blanco to Cape Bojador. The whole area is about 60,000 sq. m. and is part of the Sp. Sahara. The most important tn in R. de O. is Villa Cisneros, where there is a sub-governor. R. de O. and A. are under the governorship of the Canary Is. Dates and fish are exported. The pop. is estimated at 100,000, most of whom are nomads of Arab stock.

Rio Grande: 1. Riv. rising in the Rocky Mts, Colorado, and flowing through New Mexico and Texas to the Gulf of Mexico. There are irrigation dams near Hot Springs, New Mexico, in Texas, and near the river's mouth. A U.S.-Mexico agreement made in 1945 provides for additional irrigation projects. El Paso, Texas, is the prin. tn on the riv. Length 1800 m.

2. See ARAGUAIA.

Rio Grande do Norte, Atlantic state of Brazil in the NE. Carnaúba wax, sugar, cinchona, coffee, cotton, tobacco, timber, and rubber are produced, and horses and cattle are reared. Minerals include Brazil's most important supply of salt, and new workings of beryllium on the Borborema highland. The cap. is Natal at the mouth of the R. Potengi. Area 20,482 sq. m. Pop. 967,921.

Rio Grande (do Sul), seaport of Brazil in Rio Grande do Sul (q.v.), on the strait leading to the Lagoa dos Patos, 730 sea m. from Rio de Janeiro, and less than half that distance from Montevideo. It has a large harbour and is Brazil's most southerly port for ocean-going shipping. It is the distributing centre for the S. part of its state and exports dried meat, hides, and tobacco. There are cotton, woollen, and jute factories, an oil refinery, and fisheries. Pop. 64,240.

Rio Grande do Sul, SE. Atlantic state of Brazil, bounded on the W. by Argentina, and S. by Uruguay. It contains 2 large lakes, Lagoa dos Patos and

Lagoa Mirim. The surface is grassy steppe in character, supporting gauchos and their vast herds of cattle; dried beef and hides are exported. Coal of medium quality is mined, also wolfram, and copper, gold, agates, and amethysts are found. Agric. products, which owe much to Ger. and It. immigrants, include coffee, tobacco, rice, cereals, and sugar. Soap and textiles are made. The cap. is **Pôrto Alegre**. Area 109,067 sq. m. Pop. 4,164,821.

Rio Haacha, tn of Colombia, in the prov. of Magdalena, standing near the base of the Goajira Peninsula, 90 m. N.E. of Santa Marta, both being on the Caribbean sea coast. The roadstead is open and shallow. There are pearl fisheries, and dealings in vegetable ivory, maguey fibre, and rubber. There is an airport. Pop. 5700.

Rio Negro: 1. See **NEGRO**, Rio.

2. Ter. of Argentina in N. Patagonia, adjoining the Chubut Ter. on the N., and bounded by the R. Negro on the S. It is mainly plateau and has been made fertile by irrigation (R. Negro). Alfalfa and cereals are grown, and cattle are reared for stock. Lumbering, coal, and wine-making are the prin. occupations. Nahuel Huapi National Park and the Andean resort of S. Carlos do Bariloche are famous. Viedma is the cap. Area 78,220 sq. m. Pop. 177,195.

3. Dept. of Uruguay, bounded by the Negro on the S. and the Uruguay on the W. and crossed diagonally by the Cuchilla de Haedo. Cereals are grown and stock are raised. Fray Bentos is the cap. Area 3270 sq. m. Pop. 50,000.

Rio Pardo, agric. tn in Rio Grande do Sul, Brazil, 70 m. W. of **Pôrto Alegre**. Pop. about 6400.

Rio Tinto, Sp. riv. which rises in the Sierra de Aracena and flows SW. through the prov. of Huelva (q.v.) to the Atlantic at Huelva tn. It is joined in its estuary by the Odiel, the course of which is roughly parallel some distance to the W. The dist. through which these riva. flow is extremely rich in mineral deposits. Situated near the source of the R. T. is one of the greatest copper-producing centres in the world, called Minas de Rio Tinto.

Riobamba, cap. of Chimborazo prov., Ecuador, 100 m. S. of Quito by rail. The prin. occupations are agriculture, stock-raising and textile manuf. There is an airport. Altitude 9000 ft. Pop. 35,100. See **CATABAMBA**.

Rioja, or **La Rioja**: 1. Andine prov. of Argentina, situated between Córdoba, San Juan, and Catamarca (qq.v.). In the NW. is the Sierra Famatina (20,000 ft), with the resort of Chilecito in the valley below. Gold, copper, silver, and iron are found, and the soil is fertile in vines, maize, cotton, etc., and is drained by the Bermejo. Area 35,691 sq. m. Pop. 122,950.

2. Cap. of above prov., at the side of the Sierra Velasco, 600 m. NW. of Buenos Aires, at an altitude of 1670 ft. Lumbering and agric. are carried on. Pop. 23,164.

Rioja, the best known Sp. table wine,

grown about the headwaters of the Ebro between Hílbao and Haro, usually red, full-bodied, and strong. An inferior variety comes from Logroño (q.v.). See cross-refs under **WINES** and **SPIRITS**.

Riom, Fr. tn, cap. of an arron., in the dept. of Puy-de-Dôme. It has many ant. buildings and monuments. Here, in Feb. 1942, the Vichy Gov. (see **FRANCE**, *History*) began the trial of the politicians and soldiers alleged to be responsible for the defeat of France in 1940. The trial was suspended when Laval came to power. R. was the bp. of Barante (q.v.). Tobacco and electrical equipment are manuf. Pop. 13,000.

Rion (anc. Phasis), riv. of Transcaucasia, with a course of 200 m. from the S. slopes of the Caucasus to Poti on the Black Sea. Its link with the voyage of the Argonauts gave it fame in antiquity.

Rios, or **Los Rios**, inland prov. of Ecuador, W. of the Andes. Main products are cacao, sugar, and balsa-wood. Drained by Guayas headstreams. Cap. Babahoyo. Area 2295 sq. m. Pop. 175,419.

Riot, an assembly of at least 3 persons who, having a common purpose, execute or attempt that purpose with violence, if necessary, against anyone opposing them, displayed in such a manner as to alarm at least 1 person of reasonable firmness or courage. It is immaterial whether the object of the rioters be lawful or unlawful, the whole gist of the misdemeanour being the unlawful manner of proceeding, namely with circumstances of force and violence. By the Riot Act, 1714, a justice of the peace, sheriff, or mayor may, where the rioters number 12 or more, require them by proclamation (called reading the Riot Act) to disperse; if the rioters continue together after the lapse of 1 hour from the reading of the Act, they are guilty of felony and liable to imprisonment for life. Similarly, it is a felony to oppose the reading of the Act. Prosecutions under the Act must be begun within 12 months after the felony. Under the Riot Damages Act (1886) the local police authorities can be sued for damage done during a riot.

Riouw-Lingga, or **Rian-Lingga**, archipelago composed of 2 groups of is. of Indonesia, lying S. of the Malay Peninsula, from which they are divided by the straits of Singapore. The chief tn is Tanjung Pinang, on Bintang Is. Pepper, gambier, and rubber are cultivated, and tin and bauxite mined. Area 2,279 sq. m. Pop. 77,000. R.-L. was conquered by the Dutch late in the 18th cent. It was occupied by the Japanese in the Second World War, and became part of the Indonesian rep. in 1950.

Riparian Rights, see **RIVERS**; **FISHERIES**.

Ripley: 1. Mkrt tn and urb. dist. of Derbyshire, England, 10 m. NNE. of Derby. The tn has coal mines, iron foundries, textile manufs., boiler works, etc. Pop. 18,194.

2. Vill. of Surrey, England, on the R. Wey, 5 m. from Woking, forming with its neighbour Send a residential par. Pop. (with Send) 3300.

3. Vil. of Yorks, England, on the R. Nidd, 3½ m. from Harrogate. R. Castle dates from the 16th cent., but was largely rebuilt in 1780; Cromwell stayed there after the battle of Marston Moor. The church is 14th cent. Pop. 200.

Ripon, Frederick John Robinson, Viscount Goderich, afterwards first Earl of (1782-1859), Brit. politician, b. London and educ. at Harrow and St John's College, Cambridge. He entered the House of Commons in 1806, was chancellor of the Exchequer from 1823 until 1827, in which year he became secretary for war and leader of the House of Lords. On Canning's death (1827) he became Prime Minister, but resigned in the following year. In 1830 he was again secretary for war. In 1833 he was created Earl of Ripon, and held the offices of president of the Board of Trade (1841) and of the Board of Control for Indian Affairs (1843-6). He was an inept politician and a weak Prime Minister, but had some financial ability.

Ripon, George Frederick Samuel Robinson, first Marquis of (1827-1909), statesman, b. London. He entered Parliament in 1853, and during the Palmerston administration became under-secretary for war (1859), under-secretary for India (1861), secretary for war (1863), and secretary for India (1866). Under Gladstone he was appointed lord president of the council (1868). He was chairman of the High Joint Commission on the *Alabama* claims (1871), for which he received his marquessate. He was a Rom. Catholic convert. Gladstone appointed him viceroy of India in 1880. Later he was First Lord of the Admiralty.

Ripon, city and municipal bor. on the Ure in the W. Riding of Yorks, England, 24 m. N. of Leeds. The present cathedral dates from 1154 to 1520, and was restored by Scott in the 19th cent. This building replaced an earlier structure, of which the 7th-cent. crypt remains. Other buildings of interest in R. include the Norman chapel of St Mary Magdalen, the old almshouses, and the 18th-cent. in hall. Studley Royal and Fountains Abbey (q.v.) are near by. The bishop's palace is outside the tn. R. was once famous for its cloth and its spurs. Paint and varnish is now the chief local manuf., and there is trade in agric. produce. The city grew up round the abbey, which was founded by missionaries in the 7th cent. The first abbot was St Wilfrid, to whom the cathedral is dedicated. The tn became famous for its markets and fairs, which belonged to the Archbishop of York and the eccles. commissioners until 1800. The wakeman remained the leading official until the 17th cent. An old custom which still persists is the blowing of a horn in the market square every evening at 9 o'clock. In 1640 Charles I made the treaty of R. here with the Scots.

10,000.

Ripon Falls, on the Victoria Nile, in Uganda, where the riv. emerges from Lake Victoria. They were discovered by Speke on 28 July 1862. When the Owen

Falls hydro-electric scheme is completed the R. F. will disappear.

Ripponden, tn of the W. Riding of Yorks, England, 5 m. SW. of Halifax, with cotton, woollen, chemical, engineering, and transport industries. Pop. 5213.

Riqueti, André Boniface, Honoré Gabriel, and Victor, see MIRABEAU.

Risca, tn and urb. dist. of Monmouthshire, England, 6 m. WNW. of Newport. The main industries are coal mining and steel production. Pop. 15,000.

Rise, see MINING.

Riseley Act, see ACROBAT.

Rishis: 1. 'Seers', name given to the sons of Brahma, inspired poetic writers of the Vedic hymns, representing the families of Gritsamadas, Kusika, Vama-devyaa, Atris, Bharadvajas, and Vasishthas. The title was later given, with the significance of semi-divine, to men who had given up temporal power for an ascetic life.

2. In astronomy, the 7 chief stars of the Great Bear.

Rishton, tn of Lancs, England, 3 m. NE. of Blackburn, engaged in cotton weaving, paper-string manuf., and production of fire grates, earthenware pipes, and paper. Pop. 5700.

Rispetto, type of old It. improvised folk-poem of 6-10 (usually 8) inter-rhyming lines, sung to popular tunes.

Ristori, Adelaide (1822-96), lt. actress, b. Cliviale del Friuli. She became attached to the company of actors organised by Mascherpa for the Duchessa of Parma. She travelled in France, England, Belgium, Austria, and Germany, and played many important roles, challenging Rachel's supremacy. Her portrayal of Lady Macbeth was outstanding.

Rita, pseudonym of Mrs Desmond Humphreys, nee Gollan (d. 1938), novelist, b. Gollanfield, near Inverness. She spent part of her girlhood in Australia, then returned to England, lived for a time in Ireland, and later travelled considerably. Her books include *A Husband of No Importance*, 1891, *Peg the Rake*, 1894, *The Sinner*, 1897, *Souls*, 1903, *The House Called Hurriah*, 1909, and *Diana of the Ephesians*, 1919. Her *Recollections of a Literary Life* appeared in 1936.

Ritchie, Charles Thomson, first Baron Ritchie of Dundee (1838-1906), politician, b. Dundee. Educated at the City of London School, he became partner in his father's office (jute spinner). R. became Conservative M.P. in 1874, representing successively Tower Hamlets, St George's in the East, and Croydon. He is chiefly remembered for introducing the Local Government Act, 1888, and for his two Public Health Acts of 1891. He sat with the Conservatives, but his ideas were too progressive for many of his colleagues. His resignation was brought about by Joseph Chamberlain's attitude on tariff reform, the latter objecting to R.'s abolition of the corn duty. He was raised to the peerage in 1905.

Rite, from Lat. *ritus*, religious custom, use or habit of worship. The Christian Liturgy is divided into 2 main R.s, the

Oriental and the Western. The word R. is sometimes loosely used for the subdivisions of these, those made on the basis of language being the Gk, Slavonic, Syriac, Coptic, Latin R.s, etc.; those distinguished by variety of form being the R.s of St Chrysostom and St Mark, and the Rom. Gallican, Mozarabic, Ambrosian, Sarum, Dominican, Anglican R.s, etc. See also LITURGY; RITUAL.

Ritornello (It. 'little return'), originally a refrain and thence, in the early 17th cent., a recurrent instrumental piece played in the course of a musical stage work; later the instrumental passages between vocal portions of an anthem or aria, from which in turn is derived the meaning of the word R. as applied to the orchestral *tutti* in concertos, especially in rondos where the same theme returns several times.

Ritschl, Albrecht (1822-89), Protestant theologian, b. Berlin. He lectured on theology at Bonn (1852-89). His early work showed the influence of the Tübingen school, directly reflecting the teaching of Baur. Owing much to Schleiermacher (q.v.), he produced a *Systematic Theology*, unacceptable to orthodox Lutherans and Calvinists, which gained many adherents, e.g. Harnack. R. went beyond Kant and Lotze in excluding metaphysics from religion, teaching that religious doctrines were mere value-judgments; but contrary to Protestant thought, he stressed the importance of the Church as the sphere of Christ's atoning work. His prin. work is *Die Christliche Lehre von der Rechtfertigung und Versöhnung*, 1870-4. See A. F. Garvie, *The Ritschlian Theology*, 1899; J. Orr, *Ritschlianism*, 1903; R. Mackintosh, *Ritschl and His School*, 1915.

Ritschl, Friedrich Wilhelm (1806-76) Ger. Latinist, b. Grossvargula in Thuringia. He was appointed prof. of philology successively at Halle (1833), Breslau (1833), Bonn (1839), and Leipzig (1865). Meanwhile (1836-8) he made a visit to Italy, where he studied the Plautus palimpsest in the Ambrosian Library at Milan. R. pub. a critical ed. of *Plautus* (1848-54) and a collection of Lat. inscriptions in his *Præcæ Latinitatis Monumenta Epigraphica*, 1862. His other works are included in *Opuscula Philologica* (5 vols.), 1867-79. See study by L. Mueller, 1877.

Ritter, Heinrich (1791-1869), Ger. philosopher, b. Zerbst (Anhalt). He became prof. of philosophy at Berlin, Kiel, and Göttingen successively. His prin. work was *Geschichte der Philosophie* (12 vols.), 1829-53; Eng. trans., 1838-46.

Ritter, Karl (1779-1859), Ger. geographer, b. Quedlinburg, was appointed prof. of geography at Berlin in 1820, and lecturer at the military school. R. was one of the first to make a wide comparative study of geographical science. His chief work is *Die Erdkunde im Verhältnis zur Natur und zur Geschichte des Menschen* (10 vols.), 1822-59. See life by W. L. Gage, 1867.

Ritual (Lat. *rituale*), generic name for all the outward ceremonies of religion as

distinguished from private exercises of devotion, meditational prayer, etc. The word is, however, most frequently used in a more restricted sense for certain medieval and post-medieval books containing directions for the administration of the Sacraments and similar priestly functions. Originally all such directions were contained in Sacramentaries. In the 8th cent. the rites peculiar to bishops were taken out and formed the Pontifical; likewise the directions and rites for the Mass formed the Missal; much later in the 16th cent. the R. was formed of what was left. The first official Rom. R. was pub. by Pope Paul V in 1614. The Orthodox call their R. the Euchologion. The R. (in the broad sense) of the Anglican Church is largely traditional, but the Book of Common Prayer contains some directions. See also LITURGY.

Ritualists, name given to those who were influenced by the Oxford Movement (q.v.). A quotation from the *Contemporary Review* for Oct. 1874 may assist in forming an unbiased opinion regarding the justification for this movement. W. E. Gladstone said: 'It must be admitted that the state of things from which the thing popularly known as ritualism took historically its point of departure was dishonouring to Christianity, disgraceful to the nation, disgraceful most of all to that much-vaunted religious sentiment of the English public which in impenetrable somnolence endured it, and resented all interference with it. . . . The actual state of things was bad beyond all parallel known to me in experience or reading.' He goes on to enlarge on the baldness of the services, the horrors of the so-called music, the coldness and indifference of the lounging or sleeping congregations, and concludes by describing the services as 'probably without parallel in the world for their debasement.' With the revival of sacramentalism there arose the desire for more ornate ceremonial, but violent opposition to the movement was met with wherever the new ritual was introduced. In 1847, when the Rev. John Mason Neale took up work as warden of some old almshouses at E. Grinstead, the Bishop of Chichester inhibited him. It was known that he had placed a cross, candles, and flowers on the altar of the restored chapel of Sackville College, and the inhibition remained for 14 years. The Public Worship Regulation Act, 1874, failed to curtail the activities of the clergy who were drawn into the movement, and sev. of them were imprisoned for refusing to obey the orders of the courts. Amongst these were Arthur Tooth, T. Pelham Dale, R. W. Enslight, S. F. Green, and J. Bell Cox. It is interesting to note that in 1869 the court of arches decided in the famous Purchase case that the ornaments of the churches and vestments of the clergy, mentioned in the First Prayer Book of Edward VI, were allowable, but the Judicial Committee of the Privy Council on appeal reversed this decision. The decision of the latter court was then, and has been since, openly disregarded

by many of the clergy, and at present most bishops are extremely reluctant to take proceedings against their clergy on the grounds of ritualistic practices or even doctrinal matters, unless the latter are of very serious nature. The agitation against ritual that was once very violent has now largely subsided, and toleration has replaced suspicion and opposition.

Riu-Kiu Islands, see RYUKYU ISLANDS.

Riva, lt. tn. in Trentino-Alto Adige (q.v.), at the N. end of the Lake of Garda (q.v.). It is of very anc. origin and has been many times under siege. There are silk manufs., and the dist. produces wine and olive-oil. Pop (tn) 6700; (com.) 12,400.

Rivarol, Antoine (1753-1801), Fr. author and satirist, the son of an inn-keeper, b. Bagnols in Languedoc, assumed the title of Comte de R. He came to Paris in 1777, and was soon celebrated for his mordant wit and biting sarcasm; on the outbreak of the revolution he emigrated. Amongst his works are *Sur l'Universalité de la langue française*, 1784, and *Petit Dictionnaire des grands hommes de la révolution*, 1790, but his talent was exhibited to the best advantage in conversation and impromptu witticisms. See R. Groos, *La vraie figure de Rivarol*, 1927.

Rivaux Abbey, see RIEVAUX.

Rive, Auguste de la, see LA RIVE.

Rive-de-Gier, Fr. tn in the dept of Loire, on the Gier. It produces coal, steel, glass, and silk. Pop. 13,800.

River, a link in the circulation of the hydrosphere. Part of the moisture precipitated from the atmosphere runs off the land as sheet floods or flows; part sinks into the ground, and some of this emerges at the surface as springs; a part evaporates and returns to the atmosphere. The immediate run-off, the springs, and glaciers are the sources of natural drainage channels, and by the union of these drainage areas are formed, with a main riv. and tribs. Each channel has its own drainage area, and the line bounding it is the water-divide. Most drainage areas have an outlet to the ocean, but in some, known as inland drainage areas, the channel or channels empty into salt lakes or by evaporation even cease to exist; such areas exist in the great dry regions of the continents, e.g. the R. Amu-Darya and Syr-Darya (Aral Sea), Helmund and Murghat of Seistan, Jordan, many in the Sahara, central Australia, W. S. Africa, Argentina, W. U.S.A. Some rivs., e.g. Indus, Tigris, Euphrates, Nile, Orange, Murray-Darling, and Colorado, succeed in crossing dry areas, with diminution of volume; they are fed with rains outside the areas and gain an ocean outlet, but are not, or only with difficulty, navigable. The normal or typical riv. may be considered as flowing perennially with slight variation of volume, due to minor fluctuations of rainfall either in season or in distribution over the drainage area.

Characteristics of a Normal River. No sooner is land elevated above the surface of the ocean than forces are at work to reduce it again; of these erosion by rivs.

is the greatest. A 'young' riv. soon works a short torrential course to the sea, with narrow ravines, cataracts, and waterfalls, the main object being to produce a definite gradient whereby its course is least obstructed; in this activity it is not merely destructive, but constructive. Over hard strata falls gradually deepen, undermine, and work back, forming gorges; along the reaches a steadier, less vigorous erosion wears down a channel, while in the more level regions the accumulated sand, mud, and pebbles are deposited, raising the bed. These differently applied forces tend to produce a more uniform gradient. The term 'graded riv.' is applied to one which has largely attained this state. On more level stretches, where the velocity is less, not only is material deposited, but every obstruction has an effect in deflecting the riv. laterally, producing meanders. These, by the action of the current moving from side to side, undercutting the outer bank and depositing alluvium on the inner bank, often become so accentuated that the riv. cuts through the narrow neck of land, leaving an ox-bow lake. At this stage the riv. is constructive, depositing fine mud; its banks are above the level of the surrounding country, which is naturally fertile and well watered, and often in the case of large rivs. densely populated. A breach in the bank may then cause immense destruction. The lower Mississippi has experienced many disastrous floods. The less the velocity of the current, the greater is the amount of mud, sand, and mineral salts deposited along the course of the riv. The Mississippi is calculated to throw out at its mouth every year 6,700,000,000 cub. ft. of suspended silt, 750,000,000 cub. ft. of silt dragged along the bed, and 1,400,000,000 cub. ft. of dissolved mineral salts. Such carrying away of earth material represents a lowering of the surface over the drainage area of a foot in periods of 500 to 10,000 years. Rivs. formed before geological disturbance has elevated the land along their courses are known as antecedent rivs., those consequent on the uplifting of an area, consequent rivs. Often a riv. develops a trib. or subsequent riv. which in turn can develop its own trib. or obsequent rivs. Rivs. not only extend their length at the mouth by depositing alluvium, but also 'eat backwards' from their sources; the rate at which this occurs varies with the hardness of the geological formation of the area, and sometimes by this development a riv. can capture the waters and drainage area of another. With submergence of shore lines and the formation of floods, etc., a riv. and its tribs. may be separated; the resulting streams are known as dismembered rivs. Underground rivs. may be caused by faulting, but they occur generally in regions where the rocks are highly soluble.

Relation to Rainfall. The rainfall is not all discharged by the riv. Much is evaporated, and much goes to maintain the general level of ground water, which is

utilised by the vegetation. The occurrence of lakes as part of the drainage system regulates the flow, while lateral lakes in old rivers, or dry areas may store flood water. The Nile has 2 distinct floods, due to contributions at different times from the Abyssinian and the equatorial mts (see also WATER SUPPLY). The following rivers have a length of over 3000 m.: Amazon, Congo, Mississippi-Missouri, Murray-Darling, Nile, Yangtze; 3000-2000 m.: Amur, Irtish, Lena, Mackenzie-Peace, Madeira, Mekong, Niger, Ob, Paraná, Volga, Yellow R. (Hwang-Ho), Yenisei, Yukon; 2000-1500 m.: Brahmaputra, Danube, Euphrates, Ganges, Indus, Nelson, Orinoco, Paraguay, Purus, Rio Grande, St Lawrence, Salween, São Francisco, Si. Syr-Darya, Tocantins, Ural, Yapura, Zambezi (qq.v.).

Law Relating to Rivers: Riparian Rights. The banks of a river and the bed up to the middle line belong to the owners of the land on either side, and rivers and streams are private property. There is no right to the public of a tow-path even along navigable rivers, but in all cases the rights of the public are acquired by statute or by prescriptive possession or use. Private rights are held subject to non-interference with benefits held by owners of other parts of the river; the level of water may not be sensibly altered; any alteration or strengthening of banks must not deflect the current to the injury of other owners. Certain communal rights to water, deflection, etc., have been acquired by prescriptive use. In the curves of streams defensive embankments may be erected; the middle line in all gradual alterations remains the boundary, accretions on the inside of the bend adding to the property of the owner on that side; where sudden changes occur, the old middle boundary remains. In case of impounding or deflection under statutory powers, full purchase of right must be made or proportionate compensation paid. Fishing is private, and may not be acquired by custom or prescriptive use. The rights of fishing and navigation are public in the tidal portions of rivers, the bed being Crown property with a boundary at high-water mark; beyond that, private rights are exercised. A channel when formed suddenly affords public rights of navigation at once, but the bed remains to the former owner.

Conservancy. In the case of certain important rivers, conservators are appointed by Acts of Parliament to regulate and protect navigation and exercise the rights of the Crown for the public. By-laws are made, dredging and embanking carried out, locks and weirs established, and tolls taken, which must be expended in the public interest. Works are carried out to regulate floods, but the conservators are not liable in the case of injury due to 'natural causes.' Under various fishery Acts the control of waters containing char, trout, or salmon may be vested in conservancy boards, the fishery districts being established by quarter sessions under power granted from the Home Office.

Pollution of Rivers. See PUBLIC HEALTH.

See also FISHERIES; RIVER ENGINEERING; individual names of rivers.

See L. Dudley Stamp, *Britain's Structure and Scenery*, 1946; and J. W. Kempster, *Our Rivers*, 1947.

River Engineering comprises the works necessary: (1) to regulate the flow of water by aiding the discharge of flood water and maintaining the flow in dry seasons; (2) to prevent or control the natural erosion of banks; (3) to preserve or construct navigating channels, or canalise the river; (4) to utilise the water for purposes of irrigation or hydroelectric power (q.v.); (5) to arrange lateral reservoirs, docks, and wharves, and, in general, prevent destructive action and render the river useful to man's industry, or in the physical sense to remedy the grading of an immature river. Flood waters may be more rapidly discharged by deepening the shallow fords and cataracts, or blasting away rocky bed or cliff; by forming new cuts from curve to curve, straightening the course and increasing gradient; by regulating drainage of parts of its area and leading the collected water into suitable portions of the river; or by cutting extra channels. The water when scarce can be retarded in its flow by constructing weirs or regulating drainage, and by embanking portions where the gradient is almost lost. In most rivers, works of both kinds are necessary and must be mutually accommodated; weirs must be capable of adjustment to different levels. In many cases old bridges with narrow arches and heavy piers have to be removed or reconstructed. Embanking is usually the first remedy, as it fixes the course of the stream; it may be of massive masonry, of logs of wood fixed horizontally one above the other, of cement blocks laid down in sacks and hardened by the water, of loose rock or piled blocks of stone. Often hurdles or fascots will serve well, or loose earth embankments, afterwards bound by suitable planting and tended from time to time. Floods, however, help to maintain the channel of a river by depositing silt over surrounding country rather than in the bed of the lower course, where it would decrease gradient, and embanking increases the silting up of lower reaches. In the flood plains of mature rivers, embanking needs continual increase, and the natural tendency of the river to raise its bed is aided, with danger of bursting its banks and inundating the plain. The remedy is to supplement the banking by continuous dredging and straightening the channel, and by building sufficiently high and strong embankments which are placed well beyond the natural banks, leaving a flood foreshore. It is also important to prevent encroachment by wharves or buildings; these should be set well back and served by docks and water channels. Where possible lateral reservoirs or lakes, or unoccupied and unproductive low land, may receive flood waters. As a last resort with very old rivers, in lands prac-

tically at sea-level, pumping by windmills or any economical means is adopted.

Weirs are dams with adjustable sluice gates or sliding doors arranged across them; sometimes it is sufficient to build them solid and allow flood waters to flow over them; they may also be arranged as steel plates in grooves, so arranged as to leave the cross-section of the stream quite free in flood time, as at Richmond-on-Thames. A system of weirs divides a riv. into a series of almost horizontal layers, in each of which a navigable depth is maintained.

Locks are necessary concomitants of weirs in navigable rivs., to allow the raising or lowering of vessels from one reach to another. They are often arranged in a new cut, but the occurrence of an is. may afford a suitable site for lock and weir (see CANAL).

Tidal Portions of Rivers are best regulated by dykes built longitudinally, but jetties thrown out at intervals tend to keep a central channel, though they form difficult shoals and currents. They are not so good as cross dykes, which serve to protect the longitudinal ones from being taken in the rear, and also protect the land beyond. The longitudinal dykes are usually formed of cement or rough stones carefully adjusted and known as *training walls*. They are usually carried out with careful preservation of the funnel shape of a good estuary and are prolonged into deep water to preserve current. They diminish the scouring action of the tide by limiting the amount of water passing up-channel, but they locate more definitely the shoals and sand-banks and carry them farther out to sea, thus simplifying dredging operations. Liverpool is fortunate in having its estuary bottle-necked, a form of natural training. See also CANAL; IRRIGATION; DREDGING; DOCKS; and the articles on individual rivers. See D. Stevenson, *Canal and River Engineering* (3rd ed.), 1886; L. F. Vernon-Harcourt, *Rivers and Canals* (2nd ed.), 1896; R. C. R. Minikin, *River and Canal Engineering*, 1920; C. McD. Townsend, *Hydraulic Principles of River and Harbour Construction*, 1922; H. and F. Shenton, *River Work*, 1935; F. Johnstone-Taylor, *River Engineering*, 1938; and F. Eyre and C. Hadfield, *English Rivers and Canals*, 1945.

River Fisheries, see FISHERIES.

River Hog, *Polamochoerus porcus*, found in W. African forests, and also called the Red Bush-pig. It is red in colour, with a short, smooth coat, and is usually about 2 ft high.

River Horse, see HIPPOPOTAMUS.

River Police (London), see POLICE.

River Valleys, see VALLEY.

Rivera, Diego (1886-), Mexican painter, b. Guanahuato. He studied art in Spain, France, and Mexico. His most outstanding work appears in his frescoes, where his portrayal of historical subjects shows a treatment owing much to ancient Mexican folk-art. See life by B. D. Wolfe, 1939, and *The Frescoes of Diego Rivera*, 1929.

Rivera, Miguel Primo de, see PRIMO.

Rivera: 1. NE. dept of Uruguay on the Brazilian border. There is much cattle breeding, and gold is mined. Area 3795 sq. m. Pop. 86,000.

2. Cap. of the above, 260 m. E. by N. of Montevideo, on the Brazilian frontier. It is on the railway through to Brazil (Lirramento). It produces cattle, tobacco, and fruits. Pop. 30,000.

Riverina, dist. of New S. Wales, Australia, situated in the SW. of the state, between the Murray and Lachlan. It is particularly noted for its fine and extensive sheep-grazing grounds and wheat-growing areas; here the Murray red gum is found. The prin. tns are Hay, Naranderra, and Deniliquin.

Rivers, A. H. L. Fox Pitt, see PITT-RIVERS.

Rivers, Anthony Woodville, or Wydeville, second Earl (c. 1442-83), eldest son of the 1st Earl. Known first as Lord Scales, and a famous joustier, he became Earl when his father and brother were executed by Warwick in 1469. Uncle to the Prince of Wales (Edward V), he became his guardian in 1473. When Edward IV died, R., at Northampton, met the protector Gloucester (afterwards Richard III), who arrested him and had him executed at Pontefract on 25 June. His *Dictes and Sayings of the Philosophers*, a trans. from the Fr., was the first dated book to come from Caxton's printing press (18 Mar. 1477).

Rivers, Richard Savage, fourth Earl (2nd creation) (c. 1660-1712), soldier and courtier. In 1681 he was M.P. for Wigan and 9 years later he fought the Jacobites in Ireland. He succeeded to the earldom in 1694, and became general of horse in 1708. When Marlborough's downfall was imminent R. changed sides. He was notorious for his profligacy; he was also a friend of Swift. See also SAVAGE, RICHARD.

Rivers, Richard Woodville, first Earl (d. 1469), after being esquire to Henry V, was made governor of the Tower by Henry VI in 1424, and knighted in the following year. He took part in the war in France and in the Wars of the Roses, at first on the Lancastrian side. He had married Jaquetta of Luxembourg, widow of the Duke of Bedford, and the subsequent marriage of his daughter, Elizabeth, with Edward IV resulted in him joining the Yorkists. Edward made him constable of England, Baron R. in 1448, and Earl R. in 1466. He was beheaded in 1469, after King Edward's defeat at Edgecote.

Riverside, co. seat of R. co., California, U.S.A. It is specially famous for its citrus fruit, the seedless orange being developed here. Portland cement is made. Here are one of the colleges of the Univ. of California, for resident instruction and research, R. College, Glenwood Mission Inn, and Sherman Indian Institute. Pop. 46,784.

Rivet, fastener resembling a bolt in shape. In its manufactured state before being driven it is a round shank with a formed head at one end. Rs are made

from a special round steel bar, which has been tested for its high-tensile and shear-stress values. The bar is heated to a red heat and passed through a machine fitted with hollow-shaped dies, which squeeze and cut the bar into the required shape and length of it. There are numerous shapes or types of it. head. Those in common use are snap (or round), cone, and countersunk; other shapes include flat, oval, button, globe, steeple, pan, and mushroom.

Riveting is a simple method of joining or fastening, dating back to very ancient times. It is used for a variety of purposes, principally in shipbuilding, bridge-building, boiler-making, steel erection, and aircraft construction. The types of joint most commonly used are the lap joint, i.e. when the plates or parts to be joined overlap each other, and the butt joint, i.e. when the plates or parts are aligned in the same plane, butted together, and bonded by a cover plate or butt strap. The joints are prepared for riveting by drilling or boring holes through the plates, and particular attention is paid here to the diameter and pitch (the distance from centre to centre of adjacent holes) of these holes. The actual riveting may be done with hot or cold R.s., using hand or machine riveting hammers. In the first case, of hand-riveting, a full crew, comprising 3 men and a 'boy,' is usually employed—2 hammermen, 1 holder-up, and a R. boy. The boy heats the R. in a portable hearth or furnace, and passes it to the holder-up, who, having made sure that its surface is clean and free of oxide flaking, inserts it into the R. hole and presses on the R. with a tool called a dolly, or dolly-bar, which is capped or hollowed out to receive the R. head. The 2 hammermen, on the opposite side, immediately hammer down the protruding shank or shank point to form a tight joint. Machine riveting is used wherever practicable, and has largely superseded the hand method. In this case the R. is inserted and pressed between 2 dies by hydraulic or steam pressure. Another method of R. driving, not widely used, is that of the explosive R., which is used in the main only in aircraft construction, where the joint is complicated and difficult. The R. is drilled at the end, and a small explosive charge is fitted into the cavity. The R. is inserted into the parts to be joined, and an electrically-heated holding-up tool is held against the R. head. Heat is conducted through the R. to the charge, which fires at a given temp., and the explosion draws out the sides of the hollowed R., and forms a cup-shaped head.

Riviera (Fr. *La Rivière*), name given to a narrow strip of coast bordering the Ligurian Sea. Strictly speaking, it lies between La Spezia and Nice (qq.v.), including Monaco (q.v.), but in general usage the term includes the It. coast as far as Leghorn (the *It. R.*) and the Fr. coast as far as Hyères (the *Fr. R.*). The name *R. di Ponente* is given to that part of the It. R. which is W. of Genoa, and

the name *R. di Levante* to the part which is E. The Alps (q.v.) form the background to the Fr. R. and to the R. di Ponente, and in places reach altitudes of nearly 6000 ft; the Apennines (q.v.), which lie behind the R. di Levante, are lower. In both cases, however, the mts rise almost directly from the sea, sometimes leaving a narrow coastal plain. The It., being thus protected on the N. and open on the S., enjoys a delightful climate, marred only by an occasional bitter wind. The vegetation is naturally rich and varied, and has been greatly augmented by imported trees and plants, e.g. palms, cacti, and aloes. Roses, carnations, violets, mimosa, and other flowers are grown for export and for perfumeries. The climate and the beauty of the surroundings attract many visitors, and the R. has long been famed as a cosmopolitan holiday resort and as a resort for invalids and convalescents. A road, the *Corniche*, runs along the hillside from Nice to Genoa; it dates from Roman times and was developed by Napoleon. A railway also skirts the coast from Fréjus to La Spezia. The best known towns on the R. are Hyères, Cannes, Juan-les-Pins, Antibes, Nice, Monaco, Menton, Ventimiglia, Bordighera, San Remo, Savona, Genoa, Rapallo, La Spezia, and Leghorn (qq.v.). See G. Home, *Along the Riviera of France and Italy*, 1908; Sir F. Treves, *The Riviera and the Corniche Road*, 1921, and *A New Handbook to the Riviera*, 1930; J. Sion, *La France méditerranéenne*, 1934; C. Graves, *The Riviera Revisited*, 1948.

Rivière, Briton (1840–1920), painter, b. London, and educ. at Cheltenham and Oxford. He became an R.A. in 1881, having attained special fame as a painter of animals. He also worked in black-and-white for *Good Words* and *Punch*. Among his best-known works are 'Circus,' 1871, 'Daniel in the Lions' Den,' 1872, and 'The Gadarene Swine,' 1883.

Rivière, Jacques (1886–1925), Fr. author and critic, b. Bordeaux. He wrote for, and after 1919 was editor of, the *Nouvelle Revue Française*. R. was a leading member of the 20th-cent. school of Fr. authors who were preoccupied with spiritual values. His novels showed a masterly grasp of character and had a distinctively polished style. His pubs. include *L'Allemand*, 1918, *Aimée*, 1922, and *À la trace de Dieu*, 1925. See life by P. Chailot, 1934, also *Correspondance avec Alain Fournier* (4 vols.), 1926–7.

Rivière du Loup: 1. Riv. of Quebec, Canada. It has its source in the N. of the prov. and flows into Lake St Peter, the lake really being part of the St Lawrence. 2. City in Quebec, Canada, 117 m. below Quebec city, on the St Lawrence R. Its industry is repairing and maintaining the railway rolling stock of the Canadian National Railways. Pop. 9900.

Rivne, see *Rovno*.

Rivoli: 1. It. tn in Piedmont (q.v.), 8 m. W. of Turin (q.v.). It has a remarkable royal palace and many ancient houses. Silk is manuf. Pop. 13,000.

2. It. vii., in Veneto (q.v.), 12 m. NW. of Verona (q.v.). It was the scene of a victory of Napoleon (q.v.) over the Austrians in 1797, and of a struggle between the Austrians and Piedmontese (see ITALY, *History*) in 1848. Pop. 1700.

Rixdorf, see NEUKÖLLN.

Riyadh, tn of Saudi Arabia, 500 m. NE. of Mecca, both tns being caps. A walled tn, surrounded by date gardens, it is inhabited by Wahhabi Muslims. Pop. 60,000-100,000.

Riza Shah Pahlavi, see REZA SHAH PAHLAVI.

Rizal Mercado y Alonzo Realonda, José (1861-96), Filipino patriot, b. Calamba, Laguna prov., Luzon, of aboriginal Tagalog race. He attended the Jesuit school in Manila. He graduated from Madrid Univ. in 1885, and visited other European univs., becoming an accomplished linguist.

and lakes and is used as live-bait for jack-fishing.

Road Safety. In Great Britain the number of deaths from road accidents rose steadily between the 2 world wars, reaching a total of 6648 in 1938. This increased to 9169 in 1941. The Ministry of Transport, in conjunction with the Royal Society for the Prevention of Accidents, then launched a nation-wide R. S. campaign. As a result, the total number of road deaths in 1948 had been reduced to 4513. In subsequent years the annual total of road deaths has remained at approximately 5000 despite a very large increase in the volume of traffic. The groups most affected by road accidents are child and adult pedestrians, cyclists and their passengers, and motor cyclists.

A comparison of the totals of road casualties shows:

Personal-Injury Road Accidents and Casualties Great Britain, Annual Totals, 1949-56

Year	Number of Accidents	Number of Casualties			
		Fatal	Serious	Slight	Total
1949	146,736	4,773	43,410	128,596	176,779
1950	166,592	5,012	48,652	147,661	201,325
1951	173,409	5,250	52,369	158,874	216,493
1952	171,757	4,706	50,351	152,955	208,012
1953	186,304	5,090	56,522	165,158	226,770
1954	195,716	5,010	57,201	176,070	238,281
1955	216,681	5,526	62,106	200,290	267,922
1956	216,172	5,367	61,455	201,138	267,960

In 1886 he pub. *Noli Me Tangere*—a novel exposing the tyranny of the Spaniards in his country, from which they drove him in 1887. In 1891 his *El Filibusterismo* appeared. This was a sequel to his former novel. In 1892, returning to Manila, he was arrested and banished to Mindanao. He was seized, 1896, while on the way to Cuba as physician in a yellow-fever epidemic, and was shot as a traitor at Manila.

Rizi, Don Francisco (1608-85), a Sp. painter, pupil of Vincenzo Carducho. He became first painter to Philip IV in 1656, and continued to hold office under Charles II. R. was also appointed painter to the cathedral of Toledo. His fertility of invention and facility of execution were considerable, but his superficiality marks the decline of Sp. art. His works include pictures of sacred subjects, theatre decorations, 'The Auto-da-Fé of 1680,' etc.

Rizzio, David, see RICCIO.

Rjukan, tn in Telemark, Norway, an industrial centre created as the result of harnessing local waterfalls. Pop. 5600.

Roach, or *Leuciscus rutilus*, species of Cyprinidae found in the fresh water of Britain and of Europe generally. Its lower fins are tinged with red and rather large scales. Allied to and very like dace and chub, the R. swims in shoals in rivers.

The worst feature of road accidents has been the number of children killed and injured. Before the Second World War education authorities and teachers co-operated with the Royal Society for the Prevention of Accidents in an effort to reduce the figure of fatal child accidents, but in 1941 the total rose to nearly 1500. The campaign against child accidents was intensified, and by 1956 the total of fatal cases in this category had been reduced to 717, although over 46,000 children were injured.

In all kinds of accidents it is clear that the real cause in the majority of cases is the failure of the human element rather than of the machine or the road conditions. In the case of drivers causes of accidents have been excessive speed in the circumstances, carelessness at cross-roads, improper overtaking, careless reversing, etc. In the case of pedestrians most accidents are due to some form of 'heedless crossing.' The most important requirement for safe driving is the proper regulation of speed to the prevailing circumstances.

The Royal Society for the Prevention of Accidents has done invaluable work in impressing the gravity of the R. S. problem upon central and local government authorities and upon the general public. The society has put forward many suggestions for lowering the accident rate:

its 'kerb drill' has been widely and successfully adopted. In Sept. 1956 a national children's safety campaign was conducted under the society's auspices. This society deals also with the prevention of all other types of accidents, e.g. in industry and the home. See also HIGHWAY, Road Safety; RULE OF THE ROAD.

Road Town, cap. and only port of entry of the Virgin Is. (q.v.), on the S.E. coast of Tortola. It is a port, and trades in fish, poultry, and vegetables. There is an airfield. Pop. 700.

Road Traffic Acts, see HIGHWAY.

Roads. Strabo states that Babylon possessed paved R. as long ago as 2000 BC, and in anct Greece R. were regularly and well maintained. The Romans were great road-makers, an art which it is thought they acquired from the Carthaginians, and relics of Rom. R. still exist in Britain. The latter were carriageways about 16 ft wide, marked often, though not always, by 2 parallel ditches, the causeway between which was excavated to a firm foundation; the base course, about 9 in. thick, was of 2 courses of large flat stones with rough concrete between them; above this came a 9-in. layer of lime concrete carrying a 6-in. layer of brick, broken pottery, or stones cemented together with lime mortar. The alignment, set out by smoke signals and accurate surveying instruments, was straight ('shotgun location') over hill and dale, changes of direction being made on hill-tops; in very hilly country a road sometimes followed the contours. The chief R. were planned on a strategic basis rather than for local convenience, and were very durable, but fell into disuse when the Romans left Britain, after which wheel tracks and bridle-paths took their place, no care being taken in the construction of these tracks. A law of 1285 enacted that when a wheel track or bridle-path became impassable, as was frequently the case in bad weather, another had to be made alongside it. In 1346 the first toll for highway repairs was levied in the Brit. Isles, but the first Road Improvement Act was not passed until 1523, up to which time R. and bridges were kept in repair by lords of the manor, or in default by religious communities. In 1750 road-making revived in both England and in France, although in the U.S.A. it lagged behind at this time; in that country sundry states began to pass laws making state aid for road-making possible, until to-day the U.S.A. leads the world in R. In Britain R. were very neglected as a consequence of the enormous development in railways in the last cent., and did not revive on a really large scale until the coming of the motor car at its end.

Construction. Road-making in England is associated with the names of 2 famous civil engineers, Thomas Telford (from 1803) and James Loudon Macadam (from 1813). Telford used a hand-packed foundation of vertical stones 12-18 in. high, covered with 2½-in. stone in a layer 4-6 in. thick above it, while Macadam used such broken stone ('macadam') in

both foundation and surfacing. Telford's system proved the better, and is still used. The layers of stone were rolled with a heavy steam roller, and the top finished to a camber sufficient to drain away surface water falling on the road. Fine-grained granite, dolerite, crystalline limestone, flint, or iron blast-furnace slag are used for road construction, the wearing surface of 2½-in. stone being slurred in with wet hoggin (clayey gravel), and when dried out sealed with refined road tar applied at the rate of about 1 gallon per 4 sq. yds of surface, blinded with hard cubical stone chippings; this surface dressing has to be renewed every 3-5 years. An improved form of construction substitutes tar macadam (a form of macadam in which broken stone is coated with tar) for the older water-bound macadam wearing surface; extensive improvements have taken place in the use of bitumen (a by-product of crude petroleum) as binder. The oldest and most expensive form of bituminous road surface is that known as rock asphalt, in which bituminous limestone is ground into a fine powder, heated, and laid hot with smoothing irons to a finished thickness of 1-2 in.; mastic asphalt is a form of surface in which old rock asphalt is ground up, remelted, mixed with bitumen and stone, and run into cakes, the latter being heated on site and laid hot with wooden trowels; rolled asphalt is broken stone coated with bitumen and laid hot.

R. paved with blocks have been popular in the past, especially for heavy traffic, but have now been replaced in many cases by jointless surfacings of the asphalt type. Originally they consisted of stone blocks (setts) of granite, whinstone, or gritstone in random lengths, 5-7 in. deep and 3-4 in. wide, laid on foundations of hard core or of concrete, the joints being grouted with a thick bitumen or cement mortar; in time wood blocks came to be used in a similar manner, the timber being creosoted deal or Oregon pine of a depth of 4 or 5 in. laid tight jointed; wood paving was quieter than stone setts, but for various reasons is gradually being replaced by jointless surfacings. Footways are often surfaced with materials of the same type as those used in carriageways, but of lighter construction; in recent years concrete slabs have come into wide use for this purpose, the slabs being bedded on ashes or sand; formerly York stone was extensively used, but has tended to fall into disuse owing to cost. The edges of footways are defined by granite, whinstone, or gritstone kerbs 6 in. wide and 12 in. deep laid on a bed of concrete; for lightly trafficked R. concrete kerbs are widely used, and if properly made are quite suitable, though they are never of the same quality as natural stone kerbs.

Concrete is widely used for the construction of R., especially in dists. In the E. and S.E. of England, where supplies of hard stone of suitable size for the construction of Telford bases do not exist. Concrete carriageways are 8-12 in. thick, and are laid in bays 10-20 ft across, the

smaller bay being preferable; the joints between the bays being filled with bitumen. Concrete makes a good foundation for a black-top surfacing and lasts for years without surfacing on lightly trafficked R., such as on housing estates, but it is difficult to repair, is non-resilient, and cracks easily. R. on hill slopes are banked up with retaining walls, the drainage channel being on the verge against the hill, and the outlet may run beneath the road to the lower level. A longitudinal gradient should not exceed about 1 in 25 maximum, and should exceed 1 in 200 minimum; the camber depends on the type of surfacing (the smoother the surface, the flatter the camber), but is usually about 1 in 36, except on steep hills. In open country the surface of the road is kept above that of the surrounding lands, since then drainage is facilitated. Water in the base of a road is fatal to continued long life, and must be avoided at all costs. In modern work sight distances of 500 ft upwards are aimed at on arterial R., with curves of the greatest radius possible and super-elevation of the outer surface to counteract centrifugal force. In Germany the construction of the *Autobahn*, with its long, unbroken stretches, designed for the rapid movement of motor transport, produced many interesting forms of clover-leaf and fly-over crossings. On trunk routes in America these systems have been developed to an advanced stage to carry fast-moving, heavy traffic. During the Second World War steel mesh and perforated steel plate was used for the construction of R. and tracks at short notice. For the law of R. see HIGHWAYS; also ROAD SAFETY; RULE OF THE ROAD; TRAFFIC; TRANSPORT.

See D. C. Broome, *Testing of Bituminous Mixtures*, 1934; E. J. Elford and P. E. Spielmann, *Roadmaking and Administration*, 1934; B. H. and R. G. Knight, *Road Aggregates—their Uses and Testing*, 1935; H. J. Collins and C. A. Hart, *Principles of Road Engineering*, 1936; A. C. Hughes and P. E. Spielmann, *Asphalt Roads*, 1936; A. C. Hughes, W. G. Adam, and F. J. E. China, *Tar Roads*, 1938; B. H. Knight, *Modern Road Construction*, 1938; and C. W. Scott-Giles, *The Road Goes On*, 1946. See also Brit. Standards issued by the Brit. Standards Institution, London, and *Road Abstracts* and technical reports issued by the Road Research Laboratory, Harmondsworth, Middlesex (H.M.S.O., London).

Roanne, Fr. tn, cap. of an arron., in the dept. of Loire, on the Loire and the R. canal. It has the ruins of an anct. château. There are anthracite mines, and spinning and weaving mills. Textiles and machinery are manuf. Pop. 44,500.

Roanoke (formerly **Big Lick**): 1. City in Virginia, U.S.A., formerly in R. co., on the R. riv. in the Great Valley, 40 m. WSW. of Lynchburg. It became a city in 1884. Three years earlier its pop. numbered only 700, and R. owed its prosperity to the Virginia Railway. It is the industrial, trade, and rail centre for a

rich agric. area; it has railroad shops and manufs. foundry and machine-shop products, structural steel and bridges, rayon yarns, chemicals, clothing, textiles, furniture, tin cans, paints, and lumber millwork.

2. Riv. of Virginia and N. Carolina, U.S.A., formed by the Dan and Staunton R.s. Rising in the Allegheny Mts, it flows across the Appalachian valley and then SE. out into the W. end of Albemarle Sound. Length 410 m., navigable to Hamilton, North Carolina (head of 10-ft navigation channel). Huggs Island Dam (144 ft high, 22,500 ft long), 20 m. below Clarksville, is a unit in the flood control and hydro-electric power programme for the riv.'s basin.

Roanoke Island, 12 m. long, 3 m. wide, ls. of E. Dare co., N. Carolina, U.S.A., separated by Croatan Sound from the mainland. Raleigh attempted to settle the first Eng. colony in America here (1585-7).

Roaring, term to describe a condition in horses due to paralysis of the vocal cords in which the act of respiration is accompanied by roaring or, in milder cases, whistling sounds. It may follow strangles or respiratory disease, but it is thought that an inherited predisposition is a causal factor. The treatment is operative, by either: (1) Hobday's laryngeal operation, or (2) the creation of a permanent tracheotomy ('tubing'). See also HORSE (DISEASES).

Roaring Forties, nautical expression for regions S. of lat. 40° S., in the Southern Ocean, where heavy westerly winds prevail, which sometimes cause mariners to return to Europe by the Cape Horn route instead of by the Cape of Good Hope. The winds are known as **Brave W. Winds**. See also METEOROLOGY; TRADE WINDS; WIND.

Roasting, see COOKERY; METALLURGY. **Roatán**, ls. in the Caribbean Sea, opposite the coast of Honduras, to which it belongs. Length about 20 m.; greatest width, 5 m. It was discovered by Columbus on his fourth voyage in 1502. It has been a Brit. possession since it was given up by the Mosquito king in the 17th cent. The pop. are largely Eng. by ancestry, being descendants of pirates and mutineers who sought refuge there in the 17th and 18th cents., and Eng. is the most widely spoken language. Lumbering is carried on, and coconuts are found. The cap. of Bay ls. dept. R., is on the S. coast.

Rob Roy, *alias* Robert MacGregor (1671-1734), Highland freebooter, b. Glen Gyle, Perthshire, by Loch Katrine. He derived his prin. income from cattle-lifting, exacting money (known as blackmail) for affording protection against thieves. He espoused the Jacobite cause in 1691, and in consequence of this and his plundering raids the penal laws were renewed against his clan in 1693. In 1712 he was accused of fraudulent bankruptcy, and in 1715 followed in the wake of the rebel army at Sheriffmuir and stood watching for the booty. He surrendered to the Duke of Atholl in 1717, but soon escaped, probably

through the protection of the Duke of Argyll, to be again captured and imprisoned. He was, however, pardoned in 1727, and lived the rest of his life as a peaceful subject. He was buried beside his kindred in Balquhider churchyard, by the shores of Loch Voil. See the introduction and notes to Scott's *Rob Roy*, and lives by K. Macleay (new ed.), 1881, and A. H. Millar, 1883; also A. A. MacGregor, *Wild Drumalbin*, 1927, and *Somewhere in Scotland*, 1948.

Robartes Family, see RADNOR, EARL OF.

Robber Council, see EUTYCHES.

Robbery, forcible taking from the person of another, or in his presence, and against his will, of any money or goods to any value. The violence may be actual, or constructive, as by putting into fear by threats of any kind of injury, whether to the person, property, or reputation. The whole gist of this aggravated form of larceny (q.v.) is the force or bodily fear, though the degree of fear required to be proved to sustain a conviction necessarily varies with the circumstances: it is not necessary to prove that the fear actually existed at all, if it can be shown that the circumstances were such as to be calculated to induce fear. If there be actual physical force or violence, the offence is R., though there be no fear at all. In any case the force or fear must either precede or be synchronous with the stealing; therefore, if a pickpocket subsequently uses force to keep a stolen purse, his offence will not be R., but simple stealing from the person. The maximum punishment for R. is imprisonment for 14 years.

Robbia, *Andrea della* (1435-1525), Florentine sculptor, nephew of Luca della Robbia (q.v.). b. Florence. He was a sculptor of considerable merit, and worked at reliefs and medallions of the Madonna and medallions of infants for the foundling hospital at Florence. A. was one of his uncle's most distinguished pupils, and in some ways perfected Luca's technique, and extended the use of enamelled terra-cotta reliefs, their manufacture being carried on by his sons. See M. Cruttwell, *Luca and Andrea della Robbia and their Successors*, 1902; A. Marquand, *Andrea della Robbia and his Atelier*, 1922.

Robbia, *Luca della* (1399-1482), It. sculptor, b. Florence. He early devoted himself to sculpture, though brought up as a goldsmith, and probably studied with Ghiberti. He is best known for his works in enamelled terra-cotta, called 'Robbia ware,' a valuable collection of which may be seen in the Victoria and Albert Museum, chiefly in the form of medallions. He also executed a beautiful series of bas-reliefs for the Cantoria in the Cathedral of Florence; the tomb of the Bishop of Fiesole; and a bronze door for the sacristy of Florence Cathedral. His technique was improved upon by his successors, but the spiritual beauty of his work was never surpassed. His nephew Andrea (1435-1525) (q.v.) continued the production of 'Robbia ware,' and 5 of Andrea's 7 sons after him. See J. Caval-

lucci and E. Molinier, *Les Della Robbia*, 1884; M. Cruttwell, *Luca and Andrea della Robbia and their Successors*, 1902; and P. Schubring, *Luca della Robbia und seine Familie*, 1921.

Robertes Men, see ROBERT'S MEN.

Robert I (d. 1035), Duke of Normandy, known also as Robert the Devil. He was the father of Wm the Conqueror, and the son of Richard II, Duke of Normandy, whose sister Emma had married first Ethelred, King of England, and afterwards Canute. He governed his duchy with ability and ruthlessness, securing the Vexin from the King of France. When his only (illegitimate) son Wm was 7 years old R. set out on a pilgrimage to Jerusalem. He died of fever on his way home.

Robert II (Curt-hose) (c. 1055-1134), eldest son of William the Conqueror, whom he succeeded as Duke of Normandy. From 1074 to 1079 he was engaged in disputes with his father, which flared up into actual war in 1078, when he had to seek refuge in Flanders. All his life R. was an ineffective rebel, relying on feudal claims without giving proof of ability to discharge his feudal obligations and with little sense of political responsibility, though he seems to have been a competent soldier. R. fought both his brothers, William II and Henry I; but his capacity for endangering them was lessened by the haphazard, sporadic character of his attacks and by his continuous shortage of money. In 1106 R.'s quarrel with Henry became acute. A battle was fought between them at Tinchebrai (q.v.) in which R. was taken prisoner. He remained in captivity till his death. By this battle, won by an Eng. army under Henry, Normandy was won back for England. William le Clito, R.'s son, was at one time a claimant for the Eng. throne.

Robert I of Scotland, see BRUCE, ROBERT.

Robert II (1316-90), King of Scotland from 1371 to 1390, son of Walter Stewart and Marjory, only daughter of Robert Bruce (q.v.). He acted as regent during the exile and captivity of his uncle, David II, and was most prominent during the latter's reign. In 1371 he succeeded David, and became the founder of the Stewart dynasty. His reign was troubled by feudal dissensions, and sev. barons, including the Earls of Douglas, Mar. March, and Moray, made independent raids into England. The distress occasioned by these raids and their reprisals was very great; after the successful expeditions of 1384 and 1385 by John of Gaunt and Richard II respectively, the Scottish completely routed the English at Otterburn in 1388.

Robert III (1340-1406), King of Scotland. He succeeded his father Robert II in 1390. The war with England broke out again on the accession of Henry IV in 1399. In Aug. of the following year, Henry entered Scotland at the head of a powerful army, and advanced as far as Edinburgh, which was, however, success-

fully defended by the king's eldest son, the Duke of Rothesay. In the following year, however, Henry Percy (Hotspur) made a more destructive inroad as far as Preston in E. Lothian. Following the successes of the English, attempts were made to arrange a peace between the 2 countries, but without avail. R. was generally incompetent, and was forced into retirement in 1399. For the remaining 7 years of R.'s life, real power was in the hands of his brother, the Duke of Albany.

Robert, Leopold (1794-1835), Swiss painter, b. Les Eplatures. He engraved in Paris, and later turned to painting. R. achieved a European reputation with his pictures of lt. peasant life, but was subject to a romantic melancholy which led him to commit suicide. See life by D. Berthoud, 1941.

Robert Grossteste, see GROSSTESTE.

Robert of Brunne, see MANNING, ROBERT.

Robert of Gloucester, see GLOUCESTER.

Robert of Jumieges, see JUMIEGES.

Robert of Molesmes, Saint (1018-1110), Fr. saint and monastic reformer, b. Troyes. He became a Benedictine, and gave up his abbacy at St Michael of Tonnerre to become superior of some hermits in the forest of Collans. In 1075 he migrated to Molesmes with this community. As it prospered he became dissatisfied with its standards of conduct, and twice left Molesmes. On the second occasion R. went with SS. Stephen Harding and Alberic to Cîteaux, where they founded a monastery more in keeping with their strict ideals. This became the mother house of the Cistercian Order (q.v.). R. later returned to Molesmes at the earnest request of the monks, who appealed to Rome. See K. Spahr, *Das Leben des heiligen Roberts, eine Vucle zur Vorgeschichte von Cîteaux*, 1944.

Robert of Newminster, Saint (d. 1159), was b. Yorks. He became a Benedictine at Whitby, but later went to Fountains Abbey (q.v.) where the stricter Cistercian rule was being followed. Newminster Abbey was founded from Fountains in 1137. R. being its first abbot and largely responsible for its successful foundation.

Roberts, Sir Charles George Douglas (1860-1943), Canadian poet, novelist, and nature writer, b. Douglas, New Brunswick, son of a minister. Educ. at Fredericton Collegiate and the Univ. of New Brunswick, he was prof. of Eng. and Fr. literature at King's College, Nova Scotia, from 1885 to 1887, and of economics from 1887 until 1895. He became associate-editor of the *New York Illustrated American* in 1897. In Britain he was best known for his animal stories, such as *The Kindred of the Wild*, 1902, *The Feet of the Furtive*, 1912, and *Eyes of the Wilderness*, 1933, but in Canada he was acclaimed as an outstanding poet and as the 'father of Canadian literature.' His work showed imagination and sensitivity, and he had a remarkable prose style. R. was a prolific writer, publishing many vols. of fiction, poetry, essays, and hist. They include

Orion, and other Poems, 1880, *Are: an Ode for the Shelley Centenary*, 1892, *Around the Camp Fire*, 1896, *A History of Canada*, 1897, *Kings in Exile*, 1909, *New Poems*, 1919, and *Canada Speaks of Britain*, 1941. He was knighted in 1935. See life by F. M. Pomeroy, 1943.

Roberts, David (1796-1864), landscape and figure painter. He was b. at Stockbridge, near Edinburgh, and apprenticed to a house decorator, employing his evenings in the study of art. He was scene-painter at Glasgow, Edinburgh, and Carlisle (c. 1820), and at Drury Lane (1822). He travelled widely in Europe, Egypt, and Syria, bringing back numerous sketches. R.A. in 1841. His works include 'Rosen Cathedral', 1826, 'Interior of St Stephen's, Vienna', 'Church of St Paul at Antwerp' (Tate Gallery), 'Interior of Seville Cathedral' (1834), 'The Pyramids from the Nile' (1845). The Victoria and Albert Museum contains many water-colours by him. See life by J. Ballantine, 1866.

Roberts, Frederick Sleigh, first Earl Roberts of Kandahar, Pretoria, and Waterford (1832-1914), soldier, b. Cawnpore, India, and educ. at Clifton, Eton, Sandhurst, and Addiscombe. He entered the Bengal Artillery in 1851. He first saw active service in the Indian mutiny, in the course of which he won the Victoria Cross. He also served in Abyssinia; and on the outbreak of the Afghan war, 1878-80, he was appointed to command the Kuram div. of the army, with the rank of maj.-gen. In 1879 he distinguished himself by forcing a difficult Afghan position on the peak of Pelwar Kotai, and by gaining the victory of Charasia. For these services he was created K.C.B. In the following year he was put in command of the force sent to Kabul. From Kabul he proceeded on his victorious march to the relief of Kandahar, and near the latter place he defeated Ayub Khan, 1 Sept. 1880. He was made a baron in the following year, and was then appointed commander-in-chief of the Madras army. R. was commander-in-chief of the forces in India from 1885 to 1893. He was promoted lieutenant-gen. in 1883, gen. in 1890, and F.-M. in 1895. In Dec. 1899 he was sent to S. Africa to take command of the Brit. forces in the Boer war (see BOER WARS; SOUTH AFRICA, THE UNION OF, *History*). R. returned to England in Dec. 1900, and in the following year he was made an earl, and received a grant of £100,000 from Parliament. In the same year (1901) he followed Lord Wolseley as commander-in-chief. He held the office until its abolition in 1904. In 1905 he resigned his position on the Committee of Imperial Defence to advocate in the country the estab. of a system of national military service. On the outbreak of the First World War he was appointed colonel-in-chief of the Indian contingent in France. He went there on 11 Nov. 1914, caught a chill, and d. at St Omer. See lives by Sir G. W. Forrest, 1914; H. de Watterville, 1938; and D. James, 1964.

Roberts, Kenneth Lewis (1885-), Amer. novelist, b. Kennebunk, Maine. Educ. at Cornell, he worked for various periodicals, but is chiefly noted for his novels of early Amer. hist., all embodying the most careful research. They include *Arundel*, 1930, *Rabble in Arms*, 1933, *Northwest Passage*, 1937, *Oliver Witherell*, 1940, and *Lydia Bailey*, 1946. *Trending into Maine*, 1938, is a eulogy of his native state.

Roberts, Morley (1857-1942), novelist and travel writer, b. London. He was educ. at Bedford Grammar School and Owens College, Manchester. In 1876 he went to Australia, where he worked in the bush, chiefly with sheep and cattle, and on the Victorian railroads. In 1879 he returned to England, and was employed in the civil service. He travelled widely and visited N. and Central America, the S. Seas, and Rhodesia, his experiences greatly influencing his books. His pubs. include *The Western Avernus*, 1887, *Land Travel and Sea-faring*, 1891, *A Son of Empire*, 1900, *Thorpe's Way*, 1911, *The Private Life of Henry Maitland* (based on life of George Gissing), 1912, *Followers of the Sea*, 1923, *On the Earthquake Line*, 1924, *The Serpent's Fang*, 1930, *Women and Ships*, 1931, *A Humble Fisherman*, 1932, *Malignancy and Evolution*, 1934, *Bio-Politics*, 1938, and *The Behaviour of Nations*, 1941; he also ed. 2 books by W. H. Hudson, *A Hind in Richmond Park*, 1922, and *Men, Books, and Birds*, 1925.

Roberts, Richard (1789-1864), engineer, b. Correhova, N. Wales. In 1822 he invented the first entirely mechanical loom, and was responsible for other minor developments in the mechanisation of spinning.

Roberts, William (1895-), painter, b. London, studied art at the Slade School, and has been a regular exhibitor at London Group. From the Vorticist and Futurist movements he derived a personal and somewhat grotesque style, depicting a mechanised humanity. Examples of his work are in the Tate Gallery and Imperial War Museum.

Robert's Men, or Roberdes Men, set of lawless rovers who were notorious for their outrages in the time of Edward III. They are named in an Act of that reign with 'wastours and drawlatches' as committing divers robberies and manslaughter. Their name may be derived from Robin (Robert) Hood.

Robertson, Sir Brian Hubert (1896-), soldier and administrator, son of F.-M. Sir Wm R. (q.v.). He served in the Royal Engineers in the First World War and was awarded the D.S.O. and M.C.; then served in the Waziristan expedition (1922-3) with the rank of maj. On succeeding to the baronetcy he retired from the Army (1933) and settled in S. Africa, where he became managing director of Dunlop (S. Africa) Pty., and joined the Union Defence Force. He accompanied the S. African troops to the Middle E., served in the Eighth Army, and became chief administrative officer to Gen. (now F.-M.) Alexander (q.v.) in Italy.

After the war he was restored to the active list of the Brit. Army, and became deputy military governor, later (1947) military governor and commander-in-chief in the Brit. zone of Germany. With the end of military government there he was appointed high commissioner for the Brit. zone (a civil appointment). He was promoted lieutenant-gen. in 1946 and gen. in 1947. From 1950 to 1953 he was commander-in-chief Middle E. Land Forces. On retirement in 1953 he became chairman of the Brit. Transport Commission.

Robertson, Sir Charles Grant (1869-1948), historian, educ. at Highgate School and studied at Hertford College, Oxford. In 1893 he became a fellow of All Souls, and was senior hist. tutor at Magdalen from 1905 till 1920. He was principal of Birmingham Univ. from 1920 to 1938 and chancellor between 1927 and 1938. He returned to All Souls as domestic bursar during the Second World War. He was a brilliant administrator, and his detailed pubs., such as *England under the Hanoverians*, 1911, *Bismarck*, 1918, and *Chatham and the British Empire*, 1946, have become standard works. He was knighted in 1928.

Robertson, Frederick William (1816-53), clergyman, b. London; educ. at Edinburgh Univ. and Brasenose College, Oxford. Ordained in 1840, from 1846 until his death he was incumbent of Trinity Chapel, Brighton.

Robertson, George (1860-1933), see ANOUS, D. M.

Robertson, Sir Howard Morley, A.R.A. (1888-), architect, b. Salt Lake City, U.S.A.; was educ. in England and at the Ecole des Beaux Arts, Paris. Was Principal of the Architectural Association School of Architecture, 1920-35; President R.I.B.A., 1952-4; and was awarded the R.I.B.A. Royal Gold Medal, 1949. He was a member of the Advisory Committee for the U.N. Building, New York. He began practice in 1919 with J. M. Easton, under whose name are listed the principal buildings since designed by the firm. He has also written sev. books on architectural design, including *Principles of Architectural Composition*, 1924, and *Modern Architectural Design*, 1932.

Robertson, J. C., see PERCY ANECDOTES.

Robertson, J. Forbes, see FORBES-ROBERTSON.

Robertson, John Maskinon (1856-1933), writer and politician, b. Brodick, Arran, and largely self-educ. In 1878 he joined the *Edinburgh Evening News* as leader-writer, and from 1891 to 1893 he ed. Bradlaugh's *National Reformer*. R. became a recognised authority on free thought. He was elected in 1906 Liberal M.P. for the Tyne-side div. of Northumberland, and was parl. secretary to the Board of Trade from 1911 to 1915. Of his many books, those dealing with Elizabethan literature are the best known.

Robertson, Sir MacPherson (1860-1945), Australian philanthropist, b. Ballarat, of poor parents. As founder of the Australian confectionery firm which bears

his name, he became famous for his successful organisation of a large-scale manufacturing industry and also for the public-spirited use which he made of his wealth. As a boy he sold newspapers in the streets of Leith, Scotland, where his family lived for a time. Soon after his return to Australia he was apprenticed to a confectionery maker and later hawked his own home-made sweets for sale. From this modest beginning he soon developed a solid business. In 1923 he gave a large sum for the relief of suffering in the Jap. earthquake. Among R.'s numerous gifts to Victoria state was a large sum towards the expenses of the Australian Antarctic Expedition, 1929-30 (MacRobertson Land in Antarctica commemorates his name). In 1938 he financed and organised a 10,000-m. motor-transport exploration expedition round Australia; in 1933 he gave £100,000 to the gov. of Victoria in connection with the centenary celebrations of 1934. R. initiated the air race from England to Australia. He was knighted in 1932. See G. Taylor, *Making it Happen: the Rise of Sir MacPherson Robertson*, 1934.

Robertson, Mrs., see RICHARDSON, H. H.
Robertson, Thomas William (1829-71), dramatist, b. Newark-on-Trent. He began as an actor, but it was as a writer of plays that he became famous. His first success was *David Garrick*, 1864, and this was followed by *Society*, 1865. Then came *Cure*, 1866, *Castle*, 1867, and *School*, 1869. *Castle*, his greatest success, has been revived from time to time, enduring largely by virtue of its admirable technique. His plays reflect faithfully the manners of his time. See life by T. K. Pemberton, 1893.

Robertson, Sir William Robert (1860-1933), soldier, b. Welbourne, Lincs. He enlisted at Worcester in 16th Lancers, 1877, as a private, and showed such promise that he was commissioned, and went to India in 1888 as 2nd Lieutenant in 3rd Dragoon Guards. He rose to the rank of staff capt., and entered the Staff College at Camberley in 1897, being the first man from the ranks to do so. It was on the H.Q. staff in S. Africa, and promoted lieutenant-colonel in 1900. He was appointed commandant of the Camberley Staff College in 1910. He was director of military training at the War Office from 1913 to 1914. R. went to France as Q.M.G. of the Brit. Expeditionary Force in 1914, and was chief of Imperial General Staff from 1915 to 1918. He was made a gen. in 1916. R. strongly opposed plans for the diversion of forces from the W. front to more distant theatres of war, and in Feb. 1918, shortly before the soundness of his judgment was proved by the success of the Germans in France, was superseded by Sir Henry Wilson, and given the E. command at home. He was commander-in-chief on the Rhine from 1919 to 1920, and was appointed F.-M. in the same year. R. had been knighted in 1913 and made a baronet in 1919. In 1921 he pub. his autobiography, *From Private to Field-Marshal*.

Robertson, wine-growing dist. in the SW. of Cape Prov., S. Africa. Considerable irrigation is practised, and there is an important dried-fruit industry. Breede R. is within walking distance, and also forest camping sites. Pop.: whites, 3518; coloureds, 3122; others, 329.

Robertson-Scott, J. W. (1866-), see 'COUNTRYMAN, THE.'

Roberval, Gilles Personne de (1602-75), Fr. mathematician, b. Roberval; took part in the siege of Rochelle. He studied in Paris with Mersenne, and used his own *method of indivisibles* for the quadrature of curves and the cubature of surfaces, which brought him into conflict with Descartes. His works were pub. in 1693 by the Abbé Gallois in the *Recueil of the Mémoires de l'Académie des Sciences*.

Roberval's Balance, see BALANCE.

Robes, Mistress of the, see HOUSEHOLD, ROYAL.

Robeson, Paul, (1898-), Amer. actor and singer, b. Princeton, New Jersey. His father was a Presbyterian minister there. A Negro, R. graduated with honours at Rutgers College, the majority of whose students are white, and became prominent in the football and baseball teams. He won the coveted distinction of being elected to the Phi Beta Kappa (q.v.), a famous college fraternity. He graduated in law from Columbia Univ., but did not practise, entering upon a stage career. He appeared in America in *Emperor Jones* and sev. other plays by Eugene O'Neill (q.v.), and then embarked upon a successful career as a concert singer, specialising in Negro spirituals. He came to London in 1928, appearing in the title roles of *Emperor Jones* and *Othello*, and in the musical play, *Showboat*. He played sev. of his most successful roles in the screen productions. In 1942-5 R. appeared in a new production of *Othello* in the U.S.A., which was considered by many to be the finest performance of his career. He devoted himself increasingly to politics, and in the presidential election of 1949 supported Henry Wallace. See life by Mrs Robeson, 1930.

Robespierre, Maximilien Marie Isidore (1758-94), Fr. revolutionary leader, b. Arras. His father d. when he was young, and he owed his education to the Bishop of Arras. Tradition says that R. learned the doctrines of republicanism from one of his tutors. He followed the family profession of advocate. In 1789 he was one of the deputies of the Third Estate at the States-General. His fanaticism, self-confidence, and oratorical skill soon made him well known, and, vigorously defending the liberty of the press, he attached himself to Mirabeau in the early days of the revolution. Soon he estab. a secure position among the Jacobins (q.v.), the extremist group. R. made the proposal that members of the Constituent Assembly should be barred from its successor, the Legislative Assembly. Therefore it was as a Jacobin club member, and not as a deputy, that he continued to exert his influence on the revolution. Calculating and callous, R. connected

himself with the Marat-Danton group, using them as means to gain an undisputed ascendancy, and then bringing about their destruction. Yet his actions seem to have been dictated not from motives of personal ambition (his extraordinary disinterest in personal gain earned him Carlyle's title of 'the sea-green incorruptible'), but because of his conviction that only through him could the revolutionary ideals in which he believed so passionately be fully realised. This egoism grew with each new victory, so that, in R.'s last days, it amounted to some state of mental unbalance.

In Sept. 1792 he was elected to the National Convention, the organ which proclaimed the Fr. rep. He had already helped to create the Revolutionary Tribunal. After the execution of Louis XVI, and the downfall of the Girondists, R. became a member of the newly formed Committee of Public Safety, the body which was the real ruler of France and in which he was supreme. He was largely responsible for the 'Reign of Terror' which destroyed his former friends, Danton (q.v.) and Desmoulins (q.v.). His power was now unchallenged, but his tyranny soon caused a plot for his destruction. At this point his character appeared to disintegrate, and his confidence wavered. He secluded himself from the meeting of the Convention on 27 July 1794, at which he was openly accused of despotism, and when, too late, he tried to obtain a hearing, his power had gone, and a decree of arrest was sent out against him. He

papiers de famille, des sources originales, et des documents entièrement inédits, 1865-78.

Robey, Sir George (1869-1954), music-hall comedian, educ. at London and Dresden. He made his first professional appearance on the stage in 1891. Soon afterwards he sprang into fame with 'The Simple Dimple,' a very ordinary music-hall ditty rendered intensely comical by R.'s enunciation, grimaces, and gestures. In his early days he was extremely acrobatic, especially in his parody of Lottie Collins in 'Ta-ra-boom-de-ay!' His interrogative eyebrows became famous. He took part in many revues and films, and had some success as a serious actor, notably as Falstaff in *Henry IV* in 1935. His pubs. include *My Life up to Now*, 1908, and *Looking Back on Life*, 1933. He received the C.B.E. in 1919 and was knighted in 1954.

Robin, see ROBIN REDBREAST.

Robin Goodfellow, see PUCK.

Robin Hood, legendary hero, regarded as the leader of a band of outlaws who lived in Sherwood Forest. With his companions, pre-eminent among whom were Little John, so called from his huge stature, Friar Tuck, a jovial, pleasure-loving priest, and Maid Marian, his wife, R. H. lived a life of careless freedom and good-natured philanthropy, robbing the rich to give to the poor, and oppressing no righteous man. The oldest mention of R. H. at present known is in *Piers the Plowman*, 1377; he was very popular in the 15th cent. and onwards, and was mentioned at greater or lesser length by Shakespeare, Ben Jonson, Fuller, etc. It is at least probable that there is some historical basis for R. H., although he is regarded by some as simply the personification of the wind god or a forest elf. Many of the customs and practices associated with his name were certainly added at a later date. See the collection of ballads in the fifth vol. of F. J. Child's *English and Scotch Popular Ballads*, 1888; also J. Hunter, *The Great Hero of Ancient Minstrelsy of England: Robin Hood*, 1852; Carola Oman, *Robin Hood*, 1937; J. H. Gable, *Bibliography of Robin Hood*, 1939; and P. Valentine Harris, *The Truth about Robin Hood*, 1951. See **ROBERT'S MEN**.

Robin Hood's Bay, seaside and moorland resort on an inlet in the E. coast of Yorks, England, 6 m. SE. of Whitby, situated on lofty cliffs. The old vil. is exceptionally picturesque. Pop. of par. (Fylingdales) 1100.

Robin Redbreast (*Erithacus rubecula*), common species of the family Turdidae and the friendliest and most cherished Brit. bird. It has long been protected from human cruelty and destructiveness by an extraordinary amount of superstition and legend. Its protection is thoroughly deserved, for, while it is quite harmless to garden and farm crops, it destroys an enormous number of insects and other animal pests. Its sweetly modulated song is continued through the



ROBESPIERRE

fed, but was captured and guillotined on 28 July. His death marked the beginning of the reaction against the revolution which he had characterised in its most extreme form. See also **FRANCE, History**. See lives by H. Belloc, 1901; A. Mathiez, 1921; G. J. Renier, 1936; and R. Korngold, 1937. See also T. Carlyle, *The French Revolution*, 1837, E. Hamel, *L'Histoire de Robespierre après des*

greater part of the year, and is especially noticeable in winter. Male and female differ very slightly in plumage, but the latter is rather less brightly coloured. The young birds are yellowish olive-brown on the upper part, and dull reddish-brown on the chin, throat, and breast. Two or three nests are made during the year, often in erratic and even ridiculous positions. In the U.S.A. a migratory thrush is called the robin. See D. Lack, *The Life of the Robin*, 1943.

Robinia, genus of leguminous plants, grows wild only in N. America. It contains 20 species. *R. pseudacacia*, the bastard or false acacia, or locust-tree, and the shrubs *R. hispida*, Rose Acacia, and *R. kelavii* are cultivated in Britain.

Robins, Benjamin (1707-51), mathematician and engineer, b. Bath. He studied engineering; the results of his experiment in gunnery were pub. in his *New Principles of Gunnery*, 1742, in which he describes the ballistic pendulum—his own invention. He made observations and experiments on the force of gunpowder, flight of rockets, etc.

Robin's Pincushion, see BEDEGAR.

Robinson, Agnes Mary Frances, see DUCLAUX, MADAME.

Robinson, Edward (1794-1863), Amer. biblical scholar, b. Southington, Connecticut. Having studied in Germany, he was in 1830 appointed prof.-extraordinary of sacred literature at Andover, and in 1837 at Union Theological Seminary, New York. In 1838 and 1852 he visited Palestine and made careful surveys and investigations, which are embodied in his *Biblical Researches*. He also published a *Hebrew and English Lexicon of the Old Testament*, *Greek and English Lexicon of the New Testament*, and *Memoir of the Rev. William Robinson*, with a family genealogy.

Robinson, Edwin Arlington (1869-1935), Amer. poet, b. Head Tide, Maine. Educ. at Harvard, he worked at various jobs in New York, including that of subway inspector. His book of verse *Captain Craig*, 1902, attracted the attention of President Theodore Roosevelt, who gave him a post in the Customs House, which he held from 1905 to 1910. His first vol., *The Torrent and the Night Before*, 1896, had been followed by *The Children of the Night*, 1897. *Town Down the River*, 1910, contains the well-known poem 'Miniver Cheevy,' but it was not until he was middle-aged that R. became famous with *The Man Against the Sky*, 1916. In 1922 his *Collected Poems* were awarded the Pulitzer Prize. Later poems, mainly psychological studies, include *Avon's Harvest*, 1921, *The Man Who Died Twice*, 1924 (another Pulitzer Prize winner), *Dionysus in Doubt*, 1925, *Cavender's House*, 1929, *Muthias at the Door*, 1931, *Amaranth*, 1934, and *King Jasper*, 1935. He also wrote sev. long poems on Arthurian legends—*Merlin*, 1917, *Lancelot*, 1920, and *Tristram*, 1927, which brought him his third Pulitzer Prize. A follower of convention and tradition, he was reckoned by many the

leading Amer. poet of his time. His *Selected Letters* were pub. in 1940. See lives by M. Van Doren, 1927; L. Lippincott, 1937; H. Haxelorn, 1938; E. Kaplan, 1940; Y. Winters, 1947; and E. Neff, 1949.

Robinson, Esmé Stuart Lennox (1886-), dramatist, b. Douglas, co. Cork. He was educ. at Bandon Grammar School. His first play, *The Clancy Name*, was produced in 1908, and soon afterwards he moved to Dublin, where from 1910 to 1923 he was manager of the Abbey Theatre. Among many plays that he wrote for it are *The Cross-roads*, 1909, *The Dreamers*, 1915, *The Last Leader*, 1918, *The White-Headed Boy*, 1920, *Crabbed Youth and Age*, 1922, *The White Blackbird*, 1925, *The Big House*, 1926, and *The Far-off Hills*, 1928; he was at his best in comedies of Irish rural life. In 1947 he ed. Lady Gregory's *Journals*, and in 1951 pub. *Ireland's Abbey Theatre, 1899-1950*. He also compiled *The Golden Treasury of Irish Verse*, 1925, and *The Little Anthology of Irish Verse*, 1929, and wrote a study of W. B. Yeats, 1939. *Curtain Up*, 1942, is a vol. of reminiscences. He married a daughter of Edward Dowdon (q.v.), the Shakespearean scholar.

Robinson, Frederick John, see RIFON FIRST EARL OF.

Robinson, Henry Crabb (1775-1867), journalist and diarist, b. Bury St Edmunds, Suffolk. He travelled abroad between 1800 and 1805, and 2 years later became *The Times* correspondent at Altona, and in 1808 represented the same paper in the Peninsula. He was called to the Bar in 1813, and joined the Norfolk circuit, of which he later became leader. He was a well-known figure in the literary society of the day, and knew Goethe and Schiller. He was a famous conversationalist. His *Diaries and Journals* were ed. by Thomas Sadler, and pub. in 1869. See E. J. Morley (ed.), *The Correspondence of H. C. Robinson with the Wordsworth Circle, 1808-1856*, 1927; also lives by L. H. Vincent, 1913; Edith J. Morley, 1935; and J. M. Baker, 1937.

Robinson, Sir Hercules George Robert, first Baron Rosmead (1824-97), colonial administrator. He entered the Army in 1844, but retired 2 years later, and served in Irish Gov. depts until 1854, when he held various colonial appointments. He became governor of Cape Colony and high commissioner of S. Africa from 1880 to 1889. In that year he retired, being 2 years later created baronet. However, he returned to S. Africa in 1895, and within a few months of his arrival the Jameson Raid occurred. On his return to England in the following year he was raised to the peerage. He was an able colonial governor and an excellent administrator.

Robinson, Sir Robert, O.M. (1886-), chemist. He has been concerned in the synthesis of natural anthocyanins (q.v.) since 1924 and found them to be derivatives of the polycyclic substance flavonol. He was connected with the synthesis and

formulation of alkaloids, notably brucine and strychnine, and was one of the original workers to formulate the modern electronic theory of organic chemistry. He has occupied the Chair of Chemistry successively in the univs. of Sydney, Liverpool, St Andrews, Manchester, and Univ. College, London. In 1930 he succeeded W. H. Perkin, jun., as Waynflete Prof. of Chemistry in the univ. of Oxford. He has received numerous awards, having been created a knight in 1939, elected President of the Royal Society in 1945, and a Nobel prize winner in 1947.

Robinson, William Heath (1872-1944), artist, b. Islington. He studied at the R.A. schools. R. illustrated Hans Andersen's *Fairy Tales*, *Arabian Nights*, Poe's *Tales of Mystery and Imagination*, *Don Quixote*, and *Rabelais*. His best-known work, however, was his humorous drawings for periodicals, his speciality being grotesque and laborious mechanisms involving the most complicated operation, in order to achieve the simplest possible purposes. See life by L. Day, 1947.

Robot, see AUTOMATION; ELECTRONIC COMPUTATION; REMOTE CONTROL.

Robsart, Amy (c. 1532-1560), wife of Robert Dudley, afterwards Earl of Leicester (q.v.), daughter of Sir John R. of Syderstone, Norfolk. She married Dudley in 1550, but the marriage was childless. After Elizabeth I's accession, Dudley rapidly became the queen's favourite, and it seems likely that Elizabeth would have liked to marry him had it been possible. In 1559 popular rumour was that Dudley intended poisoning his wife. In Sept. 1560 Amy was found dead at the bottom of a staircase at Cumnor Place, her neck broken. A coroner's jury returned a verdict of death by misadventure, but both in England and abroad it was popularly believed that Dudley was responsible for Amy's murder, and that Elizabeth herself was implicated in the affair. The mystery has never been solved: the effect of Amy's death in these circumstances, however, was to force Elizabeth to abandon for ever her hopes of marrying Dudley. See E. Bekker, *Elizabeth and Leicester*, 1890; J. B. Black, *The Reign of Elizabeth*, 1936.

Robson, Flora (1902-), actress, b. S. Shields. She studied at the Royal Academy of Dramatic Art and made her first professional stage appearance in 1921. In 1933 she joined the Old Vic Company. She estab. a reputation as a fine actress in such plays as *Romeo and Juliet*, *Captain Brassbound's Conversion*, and *The Winter's Tale*. Modern plays include *Black Chiffon* and *The Innocents*. She has appeared in a number of films, including *Fire over England*, *Caesar and Cleopatra*, and *Black Narcissus*. C.B.E., 1952.

Robson Peak, mt in the Canadian Rockies, on the border between Brit. Columbia and Alberta. Height 12,975 ft.

Roe, or Rukh, fabulous bird, often identified with the Arabian *anah* and the Persian *simurgh*. It was supposed to be of enormous size and capable of performing wonderful feats of strength, e.g. carry-

ing off elephants to feed its young. The legend of the R. is contained in *The Arabian Nights*.

Roca, Cape, most westerly point of the Iberian Peninsula, 20 m. NW. of Lisbon.

Rocamadour, Fr. vil. in the dept of Lot, a place of pilgrimage. Its 15th-cent. church of Notre-Dame contains a famous wooden Madonna. Pop. 740.

Rocambole, or *Allium scordoprasum*, species of Liliaceae.

Rocella, see ARCHIL.

Roch, Saint (1293-1327), invoked as protector against the pestilence. He was b. Montpellier, France, and wandered through France, Germany, Spain, and Italy, ministering to the plague-stricken. His feast is on 16 Aug.

Rocha, Adolfo, see TORGA, MIGUEL.

Rocha, tn of St. Uruguay, cap. of the dept of Rocha, 105 m. NNE. of Montevideo. There is an airport. R. was founded in 1793. The dept has an area of 4281 sq. m. and a pop. of 86,000. Stock-raising is carried on and lead, iron, and copper are mined. Pop. 25,000.



Canadian National Railways

ROBSON PEAK, BRITISH COLUMBIA

Rochdale, co. and municipal bor. of Lancs, England, on the Roch, 11 m. from Manchester and 200 m. from London. It lies on the E. rim of the Lancs industrial area, with the moors and hills of the Pennines rising to the E. and W. The setting of the tn centre is impressive. Notable buildings are the Gothic tn hall,

built 1866-71, containing some striking examples of modern stained glass, the art gallery, the museum, library, infirmary, and sev. modern churches of all denominations. On the hill behind the tn hall is the par. church of St Chad, the fabric dating back to the 14th cent. There are secondary, grammar, and technical schools, 5 large parks, and about 144 ac. of recreation grounds and playing-fields. There are important cattle markets, and the corporation controls the large covered market hall. The Byron family became owners of the manor of R. in 1462, and retained it, except for a short period during the Commonwealth, until 1823. In the 16th cent. R. was famous for its bats and cutlery, but it did not become a bor. until 1856. R. is known as the bp. of the Co-operative movement in its modern form (see under CO-OPERATION). It was also the home of John Bright, who is buried here, and whose statue stands on the park slopes, and the bp. of Gracie Fields. An old R. custom is the gathering of rushes in Aug. with which to cover the cold stone floors during the winter, and this ceremony of carrying the rushes to the church is still commemorated in 'Rushbearing Week,' the parallel of 'Wakes Week' of other tns.

Industries include cotton spinning and weaving, dyeing, finishing and bleaching, textile engineering, rubber and cable making, fell-moniering, leather manuf., and paper and paper-tube making. Pop. 87,734.

Rochdale Canal, in Lancs and Yorks, England, extends from the Bridgewater Canal at Manchester to the Calder and Hebble Navigation at Sowerby Bridge, near Halifax.

Rochdale Pioneers, see CO-OPERATION.

Roche, Alexander Ignatius (1861-1921), landscape and portrait painter, b. Glasgow. He studied art in Glasgow and Paris. He became an R.S.A. in 1900. R. is remembered for his frescoes in the banquet hall of Glasgow municipal buildings, executed in 1900.

Roche, Sir Boyle (1743-1807), Irish politician and soldier. In 1777 he was elected a member of the Irish House of Commons. A man of rare wit and humour, he was responsible for some of the most famous 'bulls' on record. He was made a baronet in 1782.

Roche, Mazon de la, see DE LA ROCHE.

Roche Abbey, ruined Cistercian abbey in Yorks, England, 2 m. S. of Malby. R.A. was founded from Fountains Abbey (q.v.) in 1147. Parts of the gateway, chancel, and transepts remain. See also CISTERCIANS.

Roche Alum, see ROCK ALUM.

Rochecouart, Françoise Athenais de, see MONTESPAN, MARQUISE DE.

Rochecouart, Fr. tn, cap. of an arron. in the dept of Haute-Vienne, on a hill overlooking the Graine. It has an anct castle, is a market tn, and manufs. shoes. Pop. 4100.

Rochefort, small tn in the prov. of Namur, Belgium, 18 m. S.W. of Dinant. It is noted for its quarries of red marble and

lead mines, and also for the remarkable caverns and grottoes existing in the neighbourhood. Pop. 3800.

Rochefort-Lucay, Victor Henri, Marquis de (1830-1913), known as Henri Rochefort, Fr. journalist and publicist, b. Paris. He was educ. at the College of St Louis. His first attempt at play-writing in 1856 was a vaudeville, *Un Monsieur bien mis*. He followed up this success by writing a number of farces and vaudevilles. He gradually abandoned play-writing for journalism, and was attached to the staff of sev. prominent Parisian papers, including the *Figaro*, the *Soleil*, and *L'Événement*. The vigour and irony of his criticisms brought it into conflict with sev. celebrities of the time, and he fought a number of duels. Eventually he ed. his own paper, *L'Intransigeant*.

Rochefort (-sur-mer), Fr. seaport, cap. of an arron., in the dept of Charente-Maritime, on the Charente. It was developed as a fortified port by Colbert (q.v.). It has naval schools, chemical industries, and a busy trade. Pierre Loti (q.v.) was b. here. Pop. 29,500.

Rochefoucauld, see LA ROCHEFOUCAULD.

Rochelle, La, Fr. fortified seaport, cap. of the dept of Charente-Maritime, on the bay of Blacay. It was the cap. of the anct prov. of Aunis (q.v.). An important port since the 14th cent., La R. was, in the 15th and 16th cents., a Huguenot (q.v.) centre. It withstood a 6-month siege by the royal forces in 1573. In 1627 the tn sided with England, but surrendered to Louis XIII and Richelieu (q.v.) after a resistance of 15 months. In the 16th and 17th cents. it was the centre of trade with Fr. Canada. During the Second World War the Germans built a U-boat base in the suburb of La Pallice, and the tn was, consequently, frequently bombed by the Allies. La R. is a bishopric, and has many interesting buildings, including a cathedral in massive Grecian style, with a dome. The port has an extensive trade, and there are shipbuilding, metallurgical, chemical, and preserving industries. La R. is also an important tourist centre. Pop. 58,800. See F. de Vaux de Foletier, *La Rochelle d'autrefois et d'à présent*, 1923.

Rochelle Salt, or Seignette's Salt, tartrate of sodium and potassium ($\text{KNaC}_4\text{H}_4\text{O}_6 + 4\text{H}_2\text{O}$), discovered by Seignette of La Rochelle. It is a colourless solid, forming rhombic prisms, is soluble in water, and possesses a saline taste. It is prepared by neutralising acid potassium tartrate with sodium carbonate, and concentrating the solution until solidification is imminent, when it is allowed to crystallise. It is used in medicine as a laxative by itself, and also as an ingredient of the 'blue' powder in a Seidlitz combination. It is also a constituent of Fehling's solution, which is used in the estimation of sugars.

Roches Moutonnées, bare, smooth, rounded rocks, so called from their supposed resemblance to sheep, which are the result of glacial action in former ages. See also GLACIERS.

Rochester, John Willmot, second Earl of (1647-80), courtier, b. Ditchley, Oxfordshire, and educ. at Wadham College, Oxford. He succeeded to the earldom in 1658. After travelling abroad and serving in the Navy against the Dutch, he became one of the profligate set at the court of Charles II that included Buckingham, Sir Charles Sedley, and Henry Saville. R. was interested in literature, and was a patron of Dryden. He himself wrote numerous verses, in which he showed himself possessed of an agreeable power of lyrical and satirical composition, though many of his pieces are marred by their licentiousness. A fairly full ed. of his poems was pub. by J. Tonson in 1741;

to the fabric was made possible by rich offerings to the shrine of William of Perth, a pious baker who was murdered close to Rochester in 1201 during the course of a pilgrimage. He was buried in the cathedral; miracles took place at his tomb, and he was canonised in 1256. Charles Dickens spent some of his childhood at Chatham (adjoining R.), and the last years of his life at Gadshill Place on the R.-Gravesend road. His writings incorporate a great fund of local associations, and the city is often regarded as the centre of 'Dickens Land.' There are notable churches, public buildings, and old houses. There are manufs. of light machinery, and of gypsum, cement, and



RICHELIEU AT THE SIEGE OF LA ROCHELLE

A painting by Henri Motte.

in 1926 they were ed. by J. Hayward. See life by C. Williams, 1935.

Rochester, Viscount, see SOMERSET, EARL OF.

Rochester: 1. City and port of Kent, England, on the Medway, 29 m. ESE. of London, of great historical interest. It began as a small but prosperous tn during the Rom. occupation; standing where the Dover Road (Watling Street) crosses the tidal Medway, it has played an important part in national as well as Kentish hist. Its importance dates from AD 604, when Augustine founded a bishopric (the second in the kingdom), and a church was endowed by King Ethelbert. A Norman cathedral and Benedictine priory replaced the Saxon church, and about the middle of the Norman period a strongly defended castle was built. The earliest city charter is of 1189. There are important remains of the cathedral, priory, and castle. The W. doorway of the cathedral, with its highly decorative carving, is unique in England. Extension

other products. Pop. 44,860. See R. F. Jessup, *Travel Association Information Sheet No. 40*, 1946.

2. City of New York, U.S.A., co. seat of Monroe co., on the Genesee 67 m. ENE. of Buffalo. The city is well laid out, with boulevards and parks and other open spaces. It is a manufacturing centre, especially for photographic and optical equipment, clothing, thermometers, business machines, and chemicals; it makes furniture, telephone equipment, radio parts, dental supplies, railway signals, gears, and canned foods, and there are printing and meat-packing industries. It is a port of entry, with a large vol. of shipping. Eastman Kodak, Bausch and Lomb, and Taylor Instrument companies are here. R. is the seat of the univ. of R., Colgate-R. Divinity School, St Bernard's Seminary, and Nazareth College. Pop. 332,488.

3. City of Stratford co., New Hampshire, U.S.A., on the Cocheo and Salmon Falls R.s. It manufs. woollens, shoes.

wood products, paper, and bricks, and there are printing works. Pop. 13,770.

4. City, co. seat of Olmsted co., Minnesota, U.S.A., 70 m. SSE. of St Paul. It is the site of the famous Mayo Clinic, the Mayo Foundation for Medical Education and Research, and of St Mary's and 2 other hospitals, with a transient population estimated at 300,000. It has an Art Centre and a Civic Auditorium. Resident pop. 29,600.

Roche-sur-Yon, La (formerly Napoléon-Vendée, and Bourbon-Vendée), Fr. tn, cap. of the dept of Vendée, on a plateau overlooking the Yon valley. The tn was built by Napoleon I in 1804, on the site of the ant fortress of La Roche. It is a market tn and horse-breeding centre, and has flour-mills. Pop. 18,100.

Rochet, narrow-sleeved linen garment, the lower part being of lace, worn under the *mozetta* as part of the choir dress by prelates who are not members of religious orders. To wear it not covered by the *mantelletta* is a sign of jurisdiction. Anglican bishops wear it under the chimere, and bound at the wrists.

Rochford, tn of Essex, England, 3½ m. N. of Southend; it is the reputed bp. of Anne Boleyn. Pop. (rural dist.) 20,150.

Rochlitz, Ger. tn in the dist. of Karl Marx-Stadt, on the Zwickauer Mulde, 16 m. NNW. of Karl-Marx-Stadt (q.v.). It has a textile industry and other manufs., and porphyry is quarried. Pop. 7900.

Rock (O.F. *roke*, probably of Celtic origin), in common speech, large mass of hard, earth-forming material; in geology all masses forming part of the earth's crust, whether they be hard or soft. R.s are primarily classified according to their origin as sedimentary, igneous, or metamorphic. *Sedimentary* R.s are those which have been deposited in layers at the surface of the earth; *igneous* R.s are those which have solidified from the molten state; if ejected at the surface of the earth they are known as volcanic R.s, and if occurring deep down below the surface they are termed plutonic R.s; *metamorphic* R.s are those which were originally sedimentary or igneous, but have undergone alteration of form through heat, pressure, etc. The study of the arrangement and composition of R.s is part of the science of geology. Sedimentary R.s often contain fossilised remains of animals and plants; these phenomena are classified and studied under the name of *paleontology*. The description of R. material itself comes under petrology. Many R.s are composed of varying proportions of a number of simpler substances known as minerals and studied under the head of mineralogy. If of crystalline form, these minerals are further studied in the science of crystallography. See GEOLOGY; PETROLOGY.

Rock Alum, or **Roche Alum**, alum of good quality, said to have been first prepared at Roccha or Roha (Edessa).

Rock Asphalt, see ROADS, *Construction*.

Rock-basins, concave depressions in rock, sometimes of great extent, and often filled with water. Many lakes in the

highlands of Scotland and other mountainous regions fill it. The most generally accepted theory as to their origin is that they were formed by the action of ice during the glacial period. The effect of a glacier flowing down a valley would be to erode the rocks over which it flowed, shearing masses from the tops of the hills and causing the striated effect generally associated with ice action. It is also suggested that where the configuration of the valley caused the massing of the ice in a narrower and deeper layer the rock would be scooped out in a concavity whose general features would be those of a rock-basin.

Rock Channel, S. fairway into the mouth of the Mersey, along the NW. coast of Wirral Peninsula, Cheshire. It is 5 m. long and about ¼ m. wide.

Rock-climbing is really part of mountaineering (q.v.), but is practised independently in the Brit. Is., where climbing on snow and ice is rarely available, except in Scotland in winter. R. in the Brit. Is. is more artificial than mountaineering proper, as it usually involves the choice of a way up the 'difficult' side of a mt, instead of the line of least resistance to the summit (the summit being the goal in both cases). The good rock-courses, however, have the merit that once embarked on they must be followed, no alternative easy way being available. The chief centres for the sport are the Eng. Lake Dist. (notably Scafell, Great Gable, Pillar, Langdale Pike), N. Wales (notably Lliwedd and Clorwyn du'r Arddu on Snowdon, the Glyders and Tryfan), Scotland (notably Glencoe, Ben Nevis, the Cairngorms, the Torridons, and Skye), and the mountains and cliffs of Ireland. Historically it began during the last cent. with 'gully' climbs, where gymnastic strength rather than delicate balance is required; later rock-climbers came to consider *arêtes* rather than the often wet and dirty gullies as the most favourable routes for attack. In the last few years the adoption of 'rubbers' in dry weather instead of nailed boots has raised the standard of what is possible, and climbers have worked out many exposed routes on the actual rock faces. The rope is used chiefly to make possible for the rest of the party anything that the leader can climb, the principle being to divide the rock-climb into pitches; at the top of each pitch the leader must be securely placed himself, and able to belay the rope round a firm piece of rock while he brings the second up; when the second is secure the leader climbs the next pitch, the second brings up the third, and so on; occasionally the rope can be used, too, to safeguard the leader, e.g. on an exposed traverse, or for a difficult step when the second is near him. The various available courses have been classified in great detail. It has gained enormously in popularity in recent years, and was used in the Second World War as part of the training of commandos and other special troops. A vogue for R. has also sprung up on the Continent,

accompanied by widespread use of pitons, slings, snaplinks, and other devices, which have made it possible to climb overhangs and holdless vertical walls and faces. Opinions differ as to whether such methods are compatible with R. as a sport.

R. in the Brit. Is., owing to weather conditions and shortness of expeditions, is much less dangerous than mountaineering; but accidents are frequent, and any would-be climber must serve an apprenticeship with a leader of experience. Proficiency in R. is of the utmost value to the mountaineer, and may be a great safeguard to the whole party on any expedition; it is indispensable in many of the major climbs in the Alps, Rockies, Andes, and Himalaya. See the guides pub. by and the journals and bulletins of the Climbers' Club, Fell and Rock Club, and the Scottish Mountaineering Club; also J. E. Q. Barford, *Climbing in Britain*, 1946; G. W. Young, *Mountain Craft* (5th ed.), 1946; W. H. Murray, *Mountaineering in Scotland*, 1947; and G. D. Abraham, *British Mountain Climbs*, 1948.

Rock Cross, see **ARABIS**.

Rock Crystal, see **QUARTZ**.

Rock Drills, see **PNEUMATIC TOOLS**.

Rock-fish, see **WRASSE**.

Rock Gardens, see **GARDENING**.

Rock Island, city, co. seat of Rock Is. co., Illinois, U.S.A., on the Mississippi R., close to Moline and East Moline and to Davenport, Iowa, and East Moline connected by bridges. It is a leading farm-equipment and machinery centre. The U.S. R. I. arsenal is here, also Augustana College. Pop. 48,700.

Rock Monday, see **PLOUGH MONDAY**.

Rock Oil, see **PETROLEUM**.

Rock Plants, those which thrive best among stones or rocks in exposed places. Good drainage is essential, because many alpine, which make admirable R. P., while not injured by severe cold and strong sun, cannot withstand excessive moisture. A simple way of making a rock garden is to dig out soil to a depth of about 18 in., putting in a layer of broken bricks for drainage. This should be filled in with a good light soil intermixed with sand and peat and with rough pieces of rock or sandstone, so that there is plenty of soil for the plants to root freely. Dwarf plants and other suitable species of saxifrage, sedum, candytuft, lithospermum, dianthus, primula, anemone, etc., should be chosen. See R. Farrer, *The English Rock Garden*, 1919; C. Elliott, *Rock Plants*, 1935; G. A. R. Phillips, *The Rock Garden and Alpine Flowers*, 1947.

Rock Rabbit, see **HYRAX**.

Rock River, 285-m.-long riv. of the U.S.A., rising a few m. W. of Fond du Lac, Wisconsin, and flowing S. and SW. to the Mississippi R. near Rock Is., Illinois.

Rock Rose (shrub), see **CISTUS**.

Rock Salt, see **SODIUM**.

Rock Sculpture and Engraving. Its distribution ranges over many countries, and broadly speaking it varies in date from

the Upper Palaeolithic to the Bronze Age. The R. S. and E. of early man may represent a magic protection to his home; it is certainly linked in some cases with hunting economy and the influencing of food supplies; and again elsewhere there is the possibility that this decoration marks a folk-gathering place or even a cult-shrine or religious sanctuary. In the Sahara there are rock engravings which seem to date from the end of the Palaeolithic period down to the present day. In S. Africa the sacred animals of Egypt are represented together with those of Central Africa, and it is thought that the bushmen were still practising this form of art in the 19th cent. The most famous sculptures and engravings are those in caves in various parts of S. France (see **LASCAUX CAVES**) and Spain; their distribution is governed by the presence of suitable limestone caves. Animals such as the horse, rhinoceros, bison, and mammoth, together with a few tortoise and simple linear patterns, are found, and all belong to the Upper Palaeolithic. Rock engravings of the Mesolithic period with naturalistic representations of animals are known on the coast of Norway. In Sweden, N. of Gothenburg, are rock carvings of the full Bronze Age which include ships, agriculturists using an ox-drawn plough, and a fight between armed men on horses. The bibliography is extensive, and much of it consists of invaluable foreign studies. See in general M. C. Burkitt, *Prehistory*, 1925; the various vols. pub. by the Institut de Paléontologie Humaine, Paris; and bibliography under **CAVE ART**.

Rock-soap, or **Saponite**, black or nearly black mineral consisting of a mixture of aluminium silicate and iron oxide. It is a soft, friable substance with a greasy touch, and is used for the preparation of artists' crayons. Deposits are found in Saxony, Bohemia, Skye, and Antrim.

Rock Springs, city of Sweetwater co., Wyoming, U.S.A., 230 m. WNW. of Cheyenne. Alt. 6270 ft. It is a trade centre in a mining and livestock region; coal mines and oil wells are near by. It was settled in the 1860's. Pop. 10,157.

Rock Temples, hewn out of solid rock, are found in many parts of the world, notably in India, Ceylon, Egypt, Arabia, and China. There are also some interesting examples in the U.S.A., one being in Missouri near Salt R. Examples are to be found in India at Ellora and Elephanta, in Ceylon at Dambulla, in Egypt at Abu-Simbel (Ipsambul), in Arabia at Petra.

Rockall, uninhabited rocky is., part of a reef in the Atlantic, 289 m. W. of Ardnamurchan Point in Scotland, and 268 m. from Bloody Foreland, Ireland. It is 250 ft in circumference, and appears to be the highest peak of a submerged mt range, possibly part of a drowned land mass. The is. supports a famous colony of guillemots. It lies in an area extremely dangerous to shipping, and gives its name to a weather forecast (q.v.) area

of the Air Ministry meteorological service. R. was formally annexed by the U.K. in Sept. 1955.

Rockdale, metropolitan municipality of Sydney, in Cumberland co., New S. Wales, Australia. It fringes the W. shore of Botany Bay (q.v.). Pop. 76,040.

Rockefeller, John Davison (1839-1937), Amer. capitalist, b. Richford, New York, and educ. there and at Cleveland, Ohio. At 16 he became an assistant book-keeper. Although his salary was small, he saved enough by 1858 to join in founding the successful produce firm of Clark & R. The production of petroleum was a growing industry, and he and his partner backed Samuel Andrews, inventor of a process for cleaning crude oil, or 'oil refining.' In 1865 R. sold his interest in the produce firm and joined the inventor in founding the firm of R. & Andrews, which soon became R., Andrews & Flagler, the leading oil firm in Cleveland. In 1870, under Ohio law, these 3 and associates incorporated the Standard Oil Company (q.v.), with a capital of \$1m.



J. D. ROCKEFELLER, SENIOR

The new corporation began rapidly buying up and consolidating smaller concerns, and by 1880 it controlled about 90 per cent of the Amer. oil refineries, becoming known as a ruthless competitor. In 1882 R. founded the first of those gigantic combinations which were described as 'trusts.' The trustified companies were able to cut overhead costs and maintain a certain level of prices. The Standard Oil Trust was sued in the courts under many charges; and, although various decisions against it by state courts were overruled, the Standard Oil Company of New Jersey was reorganised in 1899 with a capitalisation of \$110m. to take the place of the Standard Oil Company of Ohio as the core of the Trust. Finally, in 1911, the U.S. Supreme Court ordered the dissolution of the Standard Oil Trust

on the ground that it was a combination in restraint of trade under the Sherman Anti-Trust Law. Meanwhile R. had become the world's richest man. He not only had a vast fortune out of oil, but owned big ore-fields in Minnesota, extensive coalfields in Colorado, and large stock interests in railways and banks. He retired from active direction of oil concerns about the time of the dissolution.

The suits against all companies and the exposure of some of the business methods employed inflamed public anger, and for some time R. was probably one of the most hated men in the country. But his huge gifts to science, education, and public health gained him popularity in his later years. He became indeed a classic Amer. 'character,' personifying the successful business magnate. To charities and educational institutions he gave in his lifetime more than \$500m. These activities have been carried on by his son John D., junior, and by his grandsons. See also under STANDARD OIL COMPANY. See lives by J. T. Flynn, 1932, and A. Nevins, 1940.

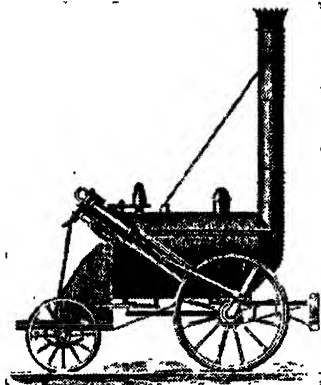
Rockefeller, John Davison, junior (1874-). Amer. industrialist and philanthropist, only son of J. D. R., b. Cleveland, Ohio, and educ. at Brown Univ. He entered his father's business, and soon became his leading assistant in the oil and coal enterprises. When the father retired all his affairs were put into the hands of the son, who devoted much time to superintending the gifts made by the various R. foundations. Among his lavish gifts was a large sum towards the restoration of Rheims cathedral. In 1946 he gave the United Nations land worth about \$8,500,000 as a site for its buildings in New York.

Rockefeller Foundation, one of the wealthiest public trusts in the U.S.A., endowed by John D. Rockefeller I (q.v.). It was chartered in 1913 with the purpose of promoting the well-being of mankind throughout the world. In 1929 it was consolidated with the Laura Spelman Rockefeller Memorial, and its net capital was about \$168m. Present interests are in agriculture, biological and medical research, and social science. The Rockefeller Bros. Fund Inc. (1940) has as its main interests aesthetics, city and regional planning, conservation of natural resources, democracy and citizenship, Negro education, religious education, health and medicine. The assets of the R. F. at the end of 1949 were \$153m.

Rocket, term applied to sev. plants of different genera all belonging to the family Cruciferae. *Cakile maritima*, the sea-rocket, grows on the coasts of Britain; it has a long tap-root and fleshy leaves. The 2 Brit. species of *Barbarea* are known as yellow-rocket or winter-cress (see CRESS), and the 1 Brit. species of *Hesperis* is also a R.

'Rocket', The, steam locomotive built by George Stephenson (q.v.) which in Oct. 1829 won the famous Rainhill competition, and so decided the use of locomotives

on the Liverpool and Manchester Railway. The design of locomotives changed little from that of the 'R.' until the 1870's.



THE 'ROCKET'

Rocket Engines, see AIR-ENGINES.

Rockets and Space Travel. ROCKETS. A rocket is a vehicle, missile, or firework operated by reaction propulsion, using either solid or liquid fuel, and where the necessary oxygen is carried internally and not obtained from the air as with a turbo-jet aircraft. Hence the rocket can travel both in atmosphere and in a vacuum, the latter being most favourable to its use, as there is no air resistance to be overcome. The rocket, both as firework and missile, was invented by the Chinese some time during the 12th or early 13th cent. A.D. It came to Europe via the Middle E., and was used for both functions (the missile only sporadically) over the centuries. Firework R. had attained a high degree of success and sophistication by 1800, but only in India, towards the end of the 18th cent., was the rocket missile being used on a large scale as a weapon of war. Its use against Brit. troops led to Sir William Congreve's developing in London the modern artillery rocket, which he produced in a practical form in 1805. R. were then successfully used on a small scale by the British against Napoleon, and later against the Americans in the War of Independence. Thereafter nearly all nations included rocket-troops in their armies, using the Congreve-type stick-rocket. In the mid-19th cent. the stick-rocket gave way to the Hale type of funnel-rocket. Rocket research was not furthered, as was gun artillery research, and the rocket became a minor auxiliary weapon. It was sometimes used as an economical primitive weapon against the natives in Far E. ters., but in Europe its military use came to an end until the First World War, when allied experiments

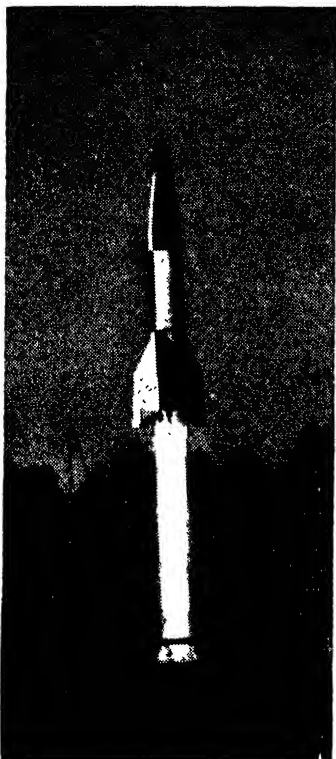
were made in using airborne R. to attack observation balloons. But R. achieved a permanent and useful function the world over as line-carriers in sea-rescue work and as signal maroons, etc. Fireworks, too, grew in complexity and popularity. However, fiction-writers in the 19th cent. soon seized on the rocket as a vehicle for space travel, and thus lent influence to the more serious-minded investigators.

In the 20th cent. interest in the rocket was revived when it was realised by Ziolkovsky, Goddard, Oberth, and others (see SPACE TRAVEL below) that rocket propulsion was effective in a vacuum and that enormous improvements in performance would be possible if the old gunpowder-type propellants were replaced by liquid fuels. The development of the liquid-propellant rocket was commenced in the U.S.A. around 1920 by R. H. Goddard and in Germany from 1927 onwards by the Verein für Raumschiffahrt (Society for Space Travel). The first actual flight of a liquid-propelled rocket was made by Goddard at Auburn, Massachusetts, in Mar. 1926. Progress was slow owing to lack of support and general scepticism, except in Germany, where after 1933 the work of the Verein für Raumschiffahrt was continued by the Army at the great research station at Peenemünde, on the Baltic, and elsewhere. This resulted in the long-range projectile V-2 (A.4) and many other guided missiles and rocket devices. Considerable work, though on a much smaller scale, was carried out by the Allies during the Second World War in the field of solid-propellant R. for short-range bombardment, A.-A. defence, etc. At the close of the war a wide variety of rocket weapons existed, many of a revolutionary nature. Extensive research, particularly into the problem of the long-range guided rocket, is now being carried out in many countries. The centre for Brit. Commonwealth research will eventually be the Anglo-Australian range near Adelaide. It extends across the desert and on to the Indian Ocean, so that projectiles with ranges up to 3000 m. may ultimately be tested. It is still convenient to divide R. into the 2 classes of solid- and liquid-propelled, and the uses of the various types are listed below.

Solid Propellant. Although solid-propellant R. have been made with weights of well over 1 ton, and ranges of 120 m., most R. in this category are relatively small and of short range. They include the familiar pyrotechnic and life-saving devices, and their most important military application has been as recoilless projectiles. Since the rocket provides its own propulsion, it needs only the lightest of launching gear, and is therefore at an enormous advantage over conventional artillery. It has thus become possible for aircraft to carry the equivalent of 6-in. guns, and for one man to handle and fire a weapon (e.g. the anti-tank Bazooka) as powerful as a small field-piece. Although such R. have relatively little accuracy, this is not always a disadvantage, and

massed rocket-projectors are a very efficient means of laying down barrages for assault purposes.

Rocket torpedoes and rocket-accelerated bombs have also been developed, the latter to give increased penetration. Solid-propellant units have been widely employed for the assisted take-off of aircraft (*see below*).



Imperial War Museum: Crown copyright

V.2

A rocket leaving the firing table during experiments conducted by the British Army Special Projectiles Operations Group, Cuxhaven, 10 Oct. 1945.

Liquid Propellant. The modern liquid-propellant rocket employs 2 fuels stored in separate tanks, and forced into the motor by pumps or gas pressure. Its thrust, unlike that of the solid-propellant rocket, can thus be regulated or reduced to zero at any time. The powers developed are also very much greater (e.g.

up to 600,000 h.p. in the case of V.2). Attempts have been made to develop R. using a single propellant, which would greatly simplify design, but only one 'monopropellant', concentrated hydrogen peroxide, has been successfully used on any scale. The best-known fuel for bi-propellant R. is the mixture of alcohol and liquid oxygen used in the V.2, first fired at Peenemünde in July 1942, and used operationally against London, Belgium, and Holland from Sept. 1944 until the end of the war. About 2000 crossed the Eng. coast, and some 1230 fell in the London area. Its maximum speed was about 3600 m.p.h., and with 1 ton of explosive its range was over 200 m.; V.2s fired vertically have reached altitudes of 115 m. Of the rocket's total mass of 12½ tons, 8½ tons were propellant, which it consumed in about 1 min. It was steered in flight by small vanes in the exhaust jet, controlled by a mechanism which slowly turned the rocket from its initial vertical ascent to an angle of 45° with the horizontal, and cut off the power when the missile had attained the speed necessary to give it the required range. The large external fins served merely to keep the rocket (now travelling as a free projectile) on the correct course when it re-entered the dense lower atmosphere. The total duration of flight for the 200 m. was about 5 min. The V.2 may be regarded as the prototype of the long-range rocket of greatly improved performance which may eventually replace the heavy bomber. For many missions the rocket is more economical than the bomber, and it is practically immune from interception. At the close of the Second World War the Germans were considering a transatlantic missile with a maximum speed of 8000 m.p.h. This would have been a 2-stage rocket, the upper component being a winged V.2 which would be 'boosted' into space by a much larger rocket, jettisoned as soon as its fuel was exhausted. This principle of the 'step-rocket' will play an important part in future development, since by using a sufficient number of 'steps' any desired final speed can be attained.

Numerous smaller guided missiles were developed by the Germans during the Second World War for various purposes such as A.-A. defence and attacks against shipping. These R. were winged and capable of speeds in the sonic region; when controlled by radio and fitted with proximity fuses they would have been deadly weapons against aircraft. They offer the only conceivable form of defence, and that a slim one, against the long-range rocket. Such missiles may also be expected in due course to replace the heavy guns on battleships; as they could be launched from quite small vessels they might in fact render the large capital ship superfluous. Because of their short endurance, R. have had only limited application for aircraft propulsion. One pure rocket fighter did, however, appear in the Second World War, the Ger. Me. 163, burning hydrogen peroxide

and a mixture of hydrazine hydrate and methyl alcohol. The maximum speed was nearly 600 m.p.h., and though the powered endurance was only 12 min., this could be extended by gliding. Its enormous rate of climb (over 10,000 ft a minute) made continuous patrols unnecessary, and it was planned to keep the aircraft on the ground until the enemy bombers were a few miles away, when it would climb almost vertically to intercept them. Such a machine may be regarded as a half-way step to the unmanned, radio-controlled guided missile.

The chief aeronautical use of it, has been for assisted take-off for heavily loaded aircraft. This technique is of considerable economic importance, since it would make higher payloads and ranges possible: it may become standard for the large jet aircraft of the future.

As the rocket provides the only means of leaving the earth's atmosphere, it is now extensively used for very high altitude research, and numerous missiles have been built to carry scientific instruments to altitudes of 200 m. or more. Some of these operate radio transmitters so that observations can be continuously recorded at ground stations, and techniques have now been evolved to return the instruments safely to earth. Much has already been learned about cosmic rays and extra-terrestrial radiations which are shielded by the atmosphere, and cannot be observed in any other way.

The very heavy fuel consumption when chemical propellants are employed makes it appear unlikely that it will be used for long-range passenger transport, though if it proves possible to utilise atomic energy for rocket propulsion this objection may be overcome, and commercial speeds in the range 10,000-20,000 m.p.h. may ultimately be expected. The most significant future use of the rocket, however, may not lie among its 'terrestrial' applications, but in its employment for the propulsion of interplanetary space-ships.

SPACE TRAVEL. Interplanetary flight has been the subject of literary speculation for centuries, but only in recent times has it become possible to indicate solutions of the many problems involved. Chief among these are the need for a form of propulsion which will operate in airless space, and a supply of energy sufficiently great to overcome the earth's gravitational attraction. The rocket, whose efficiency in vacuum is considerably greater than in air, automatically fulfils the first requirement, and may in principle fulfil the second. Realisation of this fact (notably by Goddard in the U.S.A. and Oberth in Rumania) was directly responsible for the great interest in it, which began in the 1920's, and culminated in the spectacular developments of the Second World War.

To escape from the earth a rocket must attain a speed of 11.2 km./sec. (25,000 m.p.h.), after which it will travel on into space with no further expenditure of power. Attainment of such speeds with

chemical propellants demands a multi-stage or 'step' technique, in which a large rocket carries a smaller one as its payload, and is jettisoned when its fuel is exhausted. The small machine may carry yet a third stage, and with a sufficiently large number of steps any final speed may be reached at the cost of a large initial mass. Since Mars and Venus may be reached with velocities only about 3 km./sec. greater than that needed to escape from earth, such machines could have interplanetary ranges.

Two solutions have been proposed to overcome the difficulty of the enormous size of it, required to carry sufficient food, air, etc., to enable men to make such voyages. A rocket reaching a horizontal speed of 7.9 km./sec. (18,000 m.p.h.) just outside the atmosphere would continue to circle the earth indefinitely like a second moon, and if other it. were sent up into the same orbit they could be brought to rest, by steering jets, with respect to it, and so could transfer their surplus fuel (as in aircraft 'flight refuelling'). In this way the tanks of the first machine could be replenished, and as it would now need an additional speed of only 3.3 km./sec. to reach the 11.2 km./sec. 'escape velocity', journeys to the moon and nearer planets would then become possible.

Such 'orbital' techniques may have other extremely important applications, and the construction of artificial satellites or 'space stations', both for refuelling interplanetary vessels and for scientific research, has received much attention. They would be ideal meteorological and astronomical observatories, and appear to provide a complete solution to the otherwise intractable problem of world-wide radio and television coverage. Their military value is also obvious, and was studied by the Germans before 1945, and later by the U.S. Gov. Even with these techniques, however, interplanetary journeys would still require enormous quantities of fuel, and the practical development of 'astronautics' awaits the harnessing of atomic energy. A few pounds of fissile material would, in theory, suffice to propel several hundred tons to any point in the solar system. Attempts will probably be made to produce nuclear reactors operating at very high temps., which will accelerate jets of a light gas (e.g. hydrogen), and so provide a propulsive thrust. The other problems of space flight, though numerous, are of a subsidiary character, and many have already been solved in the development of high-altitude flying. Two possible hazards, meteors and cosmic rays, have been greatly exaggerated: statistical analysis has shown that the risk of meteor collisions is very small. A condition which may prove dangerous in space is that of 'weightlessness'. This would obtain for the whole duration of any journey apart from the few minutes of take-off or landing, and *not* merely at the balance-point between opposing gravitational fields. However, if necessary an effect of apparent gravity could be produced by

giving the ship a slow spin about its axis. Centrifugal force would then give an impression of normal weight.

Typical orbits for journeys to Mars and Venus are shown in Fig. 1. These are the paths requiring the least fuel expenditure, since they make the greatest use of the planets' existing orbital velocities. The duration of the journeys would be approximately: Earth to Venus, 146 days; Earth to Mars (mean distance), 258 days. The more direct and much quicker paths would require enormously greater fuel expenditure. The exploration of the solar system, and the estab. of suitably heat- and air-conditioned bases

first few weeks of its existence, which the Russian scientists claim provided them with information about temp., density, etc., at various heights above the earth. It (or its lt.) was seen repeatedly by the naked eye in various parts of the world, and was described as resembling a shooting star of about the brightness of Vega. A second satellite, weighing about $\frac{1}{2}$ ton, was launched on 3 Nov. 1957. The maximum height of its orbit was c. 930 m. and the time of its circuit around the earth was approximately 102 min. A live dog travelled in an air-conditioned capsule in *sputnik II*. The first Amer. satellite *Explorer* was launched on 31 Jan. 1958 in an equatorial orbit at heights between 300 and 1700 m. above the earth. Fig. 2 shows the theoretical orbital and escape velocities which will open the door to space travel. See also INTERPLANETARY SOCIETY, BRITISH.

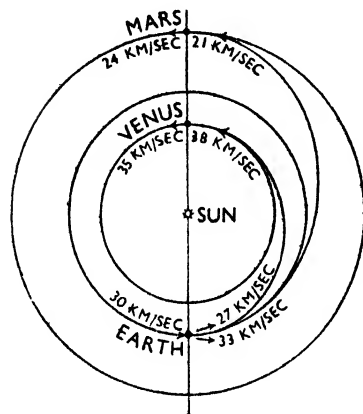
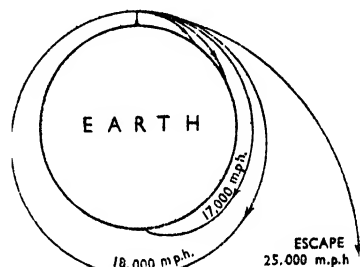


FIG. 1. THE ORBITS FOR JOURNEYS TO MARS AND VENUS

The most economical orbits ('cotangential ellipses') and the approximate speeds of the planets and of a spaceship at the beginning and end of its journey are shown. It will be seen that the 'transfer velocities' to change from one orbit to another are relatively small, i.e. 3 km./sec.

on many of the planets, may well be by far the most important outcome of the harnessing of atomic energy. Its consequences in every field of life and philosophy will be matched, if at all, only by the revolution in human thought following the discovery of the world in Renaissance times.

The era of space travel was ushered in by the successful launching from Russia in Oct. 1957 of the first artificial satellite, or *sputnik* (stated to weigh about 180 lb.). Both the satellite and the R. from which it was discharged assumed elliptical orbits of from 200 to 500 m. above the earth, the time of circuit of the former being c. 95 min. The satellite sent out more or less continuous signals during the



Courtesy Irish Press

FIG. 2. THEORETICAL ORBITAL AND ESCAPE VELOCITIES

See W. Loy, *Rockets and Space Travel*, 1944; R. H. Goddard, *Rockets*, 1946; G. P. Sutton, *Rocket Propulsion Elements*, 1949; A. C. Clarke, *Interplanetary Flight*, 1950; and the Jours. of the Amer. Rocket Society and the Brit. Interplanetary Society.

Rockfoll, see SAXIFRAGE.

Rockford, city, co. seat of Winnebago co., Illinois, U.S.A., on the Rock R. (with dam), 75 m. NNW. of Chicago. It is an important shipping and trade centre for a wide agric. area, with many manufs., including machinery, machine tools, knitted goods, and furniture. R. is the seat of R. College. Pop. 92,900.

Rockfowl, see PICATHARTES.

Rockhampton, city of Queensland, Australia, on Fitzroy R., 396 m. by rail N. of Brisbane. It is the port for one of the largest and richest pastoral belts in Australia and also for gold and copper of the famous Mt Morgan Mines. Other industries of the dist. include dairying, agriculture, cotton growing, and meat works. Pop. 41,300.

Rocking Stones, large boulders or rocks, so resting on their bases that they move gently to and fro when agitated by the hand. There are sev. famous R. S. in Cornwall, in Wales, and in Ireland. The Logan rocking stone in Cornwall is one of the largest and best known in England. R. S. have been used for purposes of divination at various times. They are of interest to geologists as examples of differential weathering and denudation.

Rockingham, Charles Watson-Wentworth, second Marquess of (1730-82), statesman, educ. at Westminster School and St John's College, Cambridge. He was made Earl of Malton in 1750 and in the same year succeeded to the marquessate. He was a Whig, and held sev. minor offices from 1751 until 1762; but 3 years later became Prime Minister for a short time and repealed the Stamp Act. He led the opposition in the House of Lords until Mar. 1782, when he again formed an administration, but he was an ineffectual leader. See memoir by Lord Albemarle, 1852.

Rockingham, vil. of Northants, England, on the co. boundary, 3 m. NW. of Corby, and formerly the centre of a royal forest. R. Castle, built by Wm the Conqueror on the site of an earlier earthwork and now a private residence, dominates the Welland valley. The vil. has many 17th- and 18th-cent. houses and cottages. Pop. 200.

Rockling, term applied to fishes of the genus *Gaidropsarus* in the cod family Gadidae. Sev. species are found on Brit. coasts.

Rockwell Test, see METAL TESTING.

Rocky Mount, tn in Edgecombe co., N. Carolina, U.S.A., 50 m. NE. of Raleigh. It has cotton mills and lumber works. It is a rail junction (repair shops) and a leading head-leaf tobacco and cotton mkt. Pop. 27,697.

Rocky Mountain Goat (*Haploceros montanus*), a member of the Bovidae which occurs in N. America. It is intermediate in position between a goat and an antelope; the latter term is, however, used popularly and is without any precise zoological significance. The R. resembles a goat in size and has long white hair with woolly undercoat, black, hollow horns, compressed at the base, and short ears.

Rocky Mountain Sheep, see BIG HORN SHEEP.

Rocky Mountains, most important mt system in N. America, traversing New Mexico, Utah, Colorado, Idaho, Wyoming, Montana, Canada, and Alaska. It is the watershed of the Amer. continent, reaching from the Yukon R. in Alaska to Santa Fé in New Mexico, a distance of 3200 m. The R. M. were first seen by white men when Verendrye sighted the Bighorn range of Wyoming in 1738. For another hundred years their history was that of a barrier to trade and travel, but by 1870 mountaineering had become a sport, and the first Amer. mountaineering club, the Appalachian, was formed in 1878.

The highest R. M. are in Alaska, where heavy glaciation, great height, remoteness, and Arctic weather set the climber hard problems. Aircraft are used for approach and supply, falling which boats and dogs are used. In the St Elias range (Yukon frontier) are Mt Logan (19,850 ft), the highest peak in Canada, climbed in 1925 by an Anglo-Amer. expedition; St Elias (18,008 ft), climbed in 1897 by the Duke of the Abruzzi; and Fairweather (15,300 ft), climbed in 1931 by Carpe and Moore. Glaciers are vast; the Malaspina glacier is 1500 sq. m. In the Wrangell range is Mt. Blackburn (16,140 ft); in the Alaskan range, Mt McKinley (20,300 ft), the highest peak of N. America, climbed in 1912 by Stuck and Karstens.

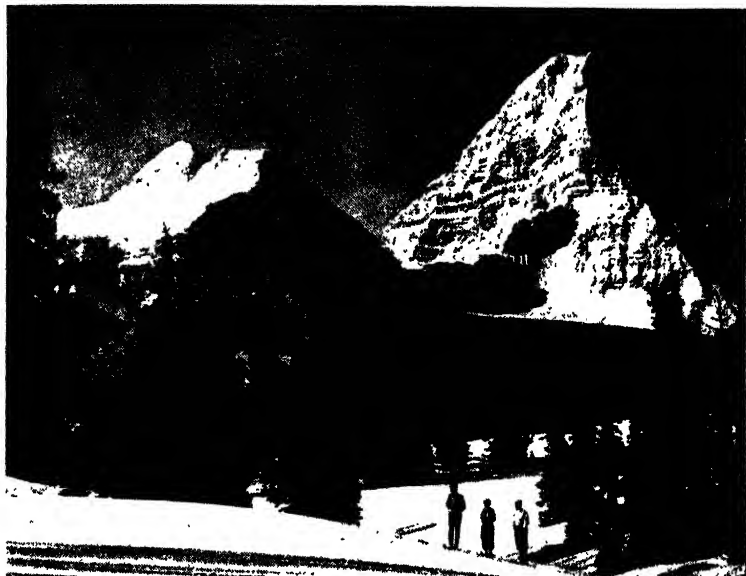
The R. M. of Canada extend 450 m. from lat. 54° to lat. 49° N. (the International Boundary), and divide Albert from Brit. Columbia. The main E. range has nearly 700 peaks exceeding 10,000 ft. The two highest are Mt Robson (12,972 ft), climbed in 1913 by Foster and MacCarthy, and Mt Columbia (12,294 ft), climbed in 1902 by Outram. The rock is unsound limestone, and glaciation is heavy. Lakes Louise, O'Hara, Maligne, and others are a feature of the eastern aspect, where mt huts and guides are available. The Selkirk and Purcell ranges to the W. contain some 50 mts above 10,000 ft. The highest peaks are Sir Sanford (11,634 ft), climbed in 1912 by Holway and Palmer, and Farnham (11,342 ft), climbed by MacCarthy in 1912. In the Monashee and Cariboo ranges, which lie W. of the Selkirks, is Mt Sir Wilfred Laurier (11,750 ft), climbed in 1923 by Carpe and Chamberlin. Glaciers of the S. Cariboo flow down to 4500 ft, and high camping is necessary.

The R. M. of the U.S.A. extend 1200 m., not as a continuous chain but in ranges separated by plateaux: (1) N. group, running 240 m. from lat. 49° N. to Jefferson R.; the main range is the Lewis, highest peak Mt Cleveland (10,438 ft). Westwards in Idaho are Bitterroot and Salmon R. ranges (Mt Hyndman, 12,078 ft), which are not in the true R. M. range. (2) Central group, running 230 m. from Yellowstone R. to Wyoming Basin. It has 5 prin. ranges: Beartooth Mts, highest peak Granite Peak (12,850 ft), climbed in 1923 by Ferguson, Koch, and Williams; Absaroka range, highest peaks all round 10,900 ft; Bighorn Mts, highest peak Cloud Peak (13,165 ft); Teton Mts, with excellent climbing on granite, especially on Grand Teton (13,747 ft), on which outstanding climbs are the first ascent in 1898 by Owen, the E. ridge in 1929 by Henderson and Underhill, and the N. face in 1931 by Fryxell and Underhill; Windriver Mts, highest peak Gannett Peak (13,785 ft), offering some of the best climbing in the U.S.A. (3) Southern group, mostly in Colorado, running 430 m. from Wyoming Basin to Santa Fé in New Mexico. Forty-six peaks top 14,000 ft in 4 main ranges: Front, Park, Sangre de Cristo, and San

Juan. These include as spurs many lesser ranges. In Front is Longs Peak (14,255 ft); in Park is Mt Elbert (14,420 ft), highest peak of the R. M. system in the U.S.A. (highest of all in the U.S.A. is Mt Whitney, 14,495 ft, in the Sierra Nevada); in the Sangre de Cristo, Blanca Peak (14,390 ft); in the San Juan, Uncompahgre Peak (14,306 ft). The ascent has been made of all peaks of great height and distinction in the R. M., but many lesser mts remain unnamed and

1903; A. P. Coleman, *The Canadian Rockies: Old Trails and New*, 1911; B. Browne, *The Conquest of Mount McKinley*, 1913; Palmer, *Climber's Guide to the Rocky Mountains of Canada*, 1930; Fryxell, *The Teton Peaks and their Ascents*, 1932; F. S. Smythe, *Rocky Mountains*, 1948.

Rococo (Fr. *rocaille*, rock-work), a form of decoration which succeeded the style of Louis XV, and exaggerated the features of that fashion. Scroll and shell ornaments are frequently used, and some-



Canadian Pacific Railway

MT ASSINIBOINE IN THE ROCKIES

virgin, more especially in Canada and Alaska. There is much scope for the making of new routes. In the U.S.A. the N. group of mts is divided from the S. by a broad depression in Central Wyoming, through which runs the Union Pacific railroad. Through the Kicking Horse valley the Canadian Pacific railway crosses the R. M. at an altitude of over 5000 ft. A motor road crossing the range by the Vermilion pass also rises above 5000 ft. See also under CANADA; UNITED STATES OF AMERICA. The Alpine Clubs of Canada and America publish important journals. See W. D. Wilcox, *The Rockies of Canada*, 1900; F. de Filippi, *The Ascent of Mount St Elias*, 1900; J. N. Collie and N. E. M. Stutfield, *Climbs and Explorations in the Canadian Rockies*,

times rock-work, combined with flowers. Derivatively, the term has come to mean bad taste in design generally, though good examples of R. exist.

Rocroi, Fr. tn in the dept of Ardennes, 2 m. from the Belgian frontier. The Great Condé (q.v.) defeated the Spaniards near the tn in 1643. The fortifications which almost enclose the tn were completed by Vauban (q.v.). There are metallurgical industries. Pop. 2000.

Rod, Pole, or Perch, see METROLOGY.
Rodbertus, Karl Johann (1805-75), Ger. socialist, b. Griefswald. He studied law at Berlin and Göttingen. In 1848 he became a member of the Prussian National Assembly, and sat for Berlin in the second chamber in 1849. He was an advocate of evolutionary socialism, and opposed

Marxism. His prin. work is *Das Kapital*, 1884. See lives by K. Jentsch, 1899; E. Thier and others, 1930. See also E. C. K. Gonrier, *The Social Philosophy of Rodbertus*, 1899; P. A. Becker, *Vergleich der Lohntheorien von Marx und Rodbertus*, 1931.

Rode, Helge (1870-1937), Dan. poet, dramatist, and literary critic, b. Copenhagen, son of a man of letters. His poetry has a religious quality and reveals him as a champion of modern mysticism. He was an opponent of materialism and of Darwin's theory of natural selection. Among his pubs. were *Hvide Blomster*, 1892, *Den Rejsende* (two series), 1900, 1929, *Solsagn*, 1904, *Komedier*, 1905, *Ariel*, 1914, *Krig og Aand*, 1917, *Moderen*, 1921, *Theatret*, 1922, *Regenerationen i vort Aandliv*, 1923, *Udvalgte Kr  tzer*, 1923, *All er godt*, 1928, and *Den r  de Rose*, 1932. See H. J. Hansen, *Dramatikeren H. Rode*, 1948.

Rodenbach, Georges Raymond Constantin (1855-98), Belgian poet and novelist, b. Tournai, and educ. at Paris and Ghent Univ. He became a barrister, spending most of his life in Paris, where he died. His main interest was poetry, however; he was a follower of the symbolist-impressionist school, and his poetry gives a fine impression of the passive melancholy of the Flem. countryside, which he knew well. Many of his works are idealizations of his youthful experiences of Flem. life. His best known verse is *Tristesses*, 1879, *La jeunesse blanche*, 1886, and *Les vics enclo  s*, 1896. He gave a vivid study of Bruges in his novel *Bruges-la-Morte*, 1887. See lives by K. Glaeser, 1917; P. Maes, 1926.

Rodent Ulcer, see CANCER.

Rodentia, large order of mammals, the largest of which does not exceed the size of a small pig, and many are among the most diminutive quadrupeds. The brain is relatively small, and the intelligence low. As a whole their diet is vegetarian, and the characteristic dentition is so specialized that the teeth are an invariable guide to the identification of a rodent. There are only 2 kinds of teeth, incisors and grinders, 2 incisors being present in the upper and lower jaws. These have open roots, and continue to grow throughout the animal's life, being kept always sharp by the dentine, which forms the greater part of the tooth, being worn away more rapidly than the harder enamel, which is left as a sharp front edge. Many R. are burrowers, some aquatic, and some arboreal, and many hibernate. Among the R. are the most destructive of man's enemies. Typical examples are the rats, mice, and squirrels.

Roderic (d. 711), last Visigoth King of Spain. His short reign marks the beginning of Arab domination in Spain. He was defeated in 711, at Jerez de la Frontera on the banks of the Guadalete, by the Arab or Saracenic forces under Tarik which had invaded Spain to help Witiza's sons to regain the throne, and was probably either slain in battle or drowned in his flight. He is the hero of Scott's

Vision of Don Roderick and Southey's *Roderick the Goth*. See A. H. Krappe, *The Legend of Roderick*, 1926.

Rodewisch, Ger. tn in the dist. of Karl-Marx-Stadt, in the Erzgebirge, 33 m. SW. of Karl-Marx-Stadt (q.v.). It has textile manufs. Pop. 11,000.

Rodez (Rom. Segodunum), Fr. tn, cap. of the dept. of Aveyron, on the Aveyron. It has Rom. remains, is the seat of a bishopric, and has a fine Gothic cathedral. There is an agric. market, and textiles are manuf. Pop. 20,400.

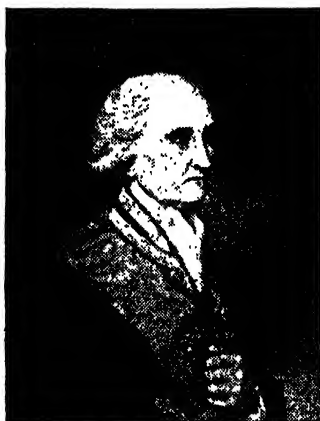
Rodgers, John (1773-1838), Amer. naval officer, b. Harford co., Maryland. He entered the Navy in 1798, commanded the *Congress* at Tripoli (1804), and on the declaration of peace dictated terms to the Bey of Tunis. In 1812, when war was declared by the U.S.A., R. commanded in the first battle of the war and captured a number of British merchantmen. In 1823 he was secretary of the Navy. He commanded the American Squadron in the Mediterranean, 1825-7.

Rodgers, Richard, see HAMMERSTEIN.

Rodin, Fran  ois Auguste (1840-1917), Fr. sculptor, b. Paris. At first he studied under Barye (q.v.), but necessity drove him in 1864 to accept employment in the studio of Carrier-Belleuse, with whom he remained for 6 years. Here he acquired mastery of the technique of sculpture. After 1870, however, there was nothing to attract him in Paris; all art had been temporarily crushed by the siege. From 1871 to 1877 he worked in Brussels under Van Raabourg; subsequently he returned to Paris, where most of his finest work was accomplished. Here he became the best-known and most successful sculptor of his day. His output reached prodigious proportions. Casts of his statues were purchased for collections all over the world. His 'Monument to Victor Hugo,' representing the poet, nude, and his 'Balzac' (in dressing-gown) caused a great sensation. His most important works are on permanent view at the Mus  e It. in Paris, a building which was made available to It. at the height of his career. It's genius led him outside the old Gk ideals. His modelling of the human figure is unsurpassed; the accentuation of muscles is characteristic; he produced a splendid depth of shadow, and the beauty of every curve was well brought out. At the same time the psychology of his subjects was expressed with a truth and conviction almost unparalleled in sculpture; the man's hands in 'The Kiss,' and the imprisonment of a hand or foot in the marble block in sev. of his pieces, are wonderful in the vivid portrayal of emotion and of spiritual significance. The influence of his work brought forth a school of vigorous naturalism, which has continued to inspire sculptors up to the present day. *Movement* is the predominant feature of his sculpture. It lacks almost entirely the monumental calm of pre-classical Gk sculpture, and is static only in so far as it is a representation of arrested movement. The contemporary progressive school of

sculpture has reacted strongly against R.'s conception of sculpture and has sought inspiration from primitive carving rather than the untiring observation of the human figure, which was the foundation of all R.'s work. He remains, nevertheless, unsurpassed in his power of vision and in the passionate humanity of his work, which has had a wider appeal than that of any sculptor after his time. Some of his finest pieces are 'The Burghers of Calais,' of which there is a replica in the Victoria Tower Garden, London; 'The Kiss'; 'St John the Baptist'; 'Danaid'; 'Eve'; 'The Thinker' (presented by Lord Grimthorpe to the Brit. nation, 1904); 'The Hand of God'; 'The Prodigal Son'; and 'The Gate of Hell,' a colossal inspiration, after Dante's *Inferno*. He made busts of Hugo, Bastion-Lepage, Rochefort, Berthelot, and l'avis de Chavannes. He made many etchings, and his drawings have an individual beauty. See lives by C. Black, 1905; J. Cladel, 1908; J. Kahn, 1912; C. Maclair, 1918; A. M. Ludovici, 1926; E. Waldmann, 1945; R. M. Rilke (Eng. trans., 1946); and Phaidon Press, *Rodin*, 1949.

Rodman, Thomas Jefferson (1815-71), Amer. military officer, was b. Salem, Indiana. He invented the R. gun, which is cast on a hollow core, the metal being cooled by a stream of water running through the inside.



LORD RODNEY

Rodney, George Brydges Rodney, first Baron (1719-92), sailor, b. London. He entered the Navy in 1732, and in 10 years rose to the rank of capt. In 1747 he took part in the action against the French and was highly commended. He was promoted rear-adm. in 1759, and in July of that year bombarded Havre, and destroyed the flotilla designed for the

invasion of England. At the end of 1779, when he had been promoted adm., he accepted the command of the Leeward Is. station and on his way encountered the Sp. fleet off Cape St Vincent, and defeated it. His famous naval victory of the Battle of the Saints (q.v.) over the combined Fr. and Sp. fleets secured to England her W. Indian colonies. The battle was fought off Dominica on 12 April 1782. R. was raised to the peerage and granted a pension of £2000 a year for himself and his successors (commuted 1924). See also SAINTS, BATTLE OF. See lives by G. B. Mundy, 1830; D. Hannay, 1891.

Rodriguez, or Rodrigues, is. in the Indian Ocean, 350 m. E. of Mauritius, of which it is the most important dependency. It is under the administration of a magistrate, who takes his orders from the governor of Mauritius, and is a station on the cable route between S. Africa and Australia. Cattle, beans, salt fish, and goats are the prin. exports. Area 42 sq. m. Pop. 14,000.

Roe, Richard, and Doe, John, see FICTION, LEGAL; RECOVERY OF LAND.

Roe, Sir Thomas (1851-1644), traveller and diplomat, b. Low Leyton, Essex, and educ. at Magdalen College, Oxford. He received a court appointment in 1603, and was knighted 2 years later. In 1610 he sailed up the Amazon and Orinoco, and made other voyages to this area in later years, searching for gold. In 1615 he went as Eng. ambas. to the Mogul court, where he estab. the foundations of Eng. power in India by obtaining privileges for Eng. merchants there. Later he was ambas. at Constantinople, and undertook missions to Poland, Sweden, and Germany. He was M.P. for Tamworth in 1614, and for Oxford Univ. in 1640. It is a striking example of the close link between commerce and politics in the early 17th cent., and his life illustrates the versatility of the Jacobean gentleman. A revised ed. of his *Journal* was pub. in 1927 (ed. Sir W. Foster).

Roebing, John Augustus (1806-69), Amer. engineer of Ger. origin, who came to America as a young man and took up engineering at Pittsburgh. He was appointed to several successive posts in connection with the surveying work necessitated by the laying of the new American railways. He constructed the Monongahela suspension bridge and the suspension bridge over Niagara Falls, and it is by his bridge-building that he is remembered.

Roebourne, vill. of W. Australia, 750 m. N. of Perth, and about 7 m. inland. It has pearl fisheries, and gold is also found in the neighbourhood. Pop. 463.

Roebuck, John (1718-94), chemist, b. Sheffield. He took a degree in medicine at Edinburgh Univ. and became a medical practitioner in Birmingham. He made scientific experiments in his spare time, and invented the first commercial method for manufacturing sulphuric acid, the lead-chamber process, in 1746. Later he helped to found the iron industry in Scotland.

Roebuck, John Arthur (1801-79), politician, b. Madras and educ. in Canada. He settled in England, and was called to the Bar in 1831. In the following year he entered Parliament. He held radical views, and among his projects was a forerunner of the Asquith Parliament Act, limiting the veto of the House of Lords. He was an independent member, but in sympathy with the Radicals, and became an original member of the Reform Club (1836). In 1855 he moved for an inquiry into the conduct of the Crimean war, and was thus instrumental in bringing about the fall of the Aberdeen ministry. Later he abandoned his alliance with the Radicals and supported Disraeli's E. policy.

Roebuck, see ROEDER.

Roedean School, public school for girls, founded in Kemp Tn, Brighton, in 1885. It was moved to its present buildings, 3 m. E. of Brighton, in 1898, and incorporated by Royal Charter in 1938.

Roeder, or Roebuck (*Capreolus capreolus*), small deer, native to Britain, where few still survive in a purely wild state, though many are preserved in Epping Forest, New Forest, and elsewhere. This species also occurs over central and S. Europe, and other races range as far E. as China. The buck stands about 26 in. at the shoulder, and is 48 in. in length, from the nose to the tiny tail. The colour in summer is red-brown (in winter the redness disappears), and the underparts are yellowish-grey. The young at first are reddish-brown with white spots. The horns average about 8 in. in length with points. Rs are stalked with the rifle from June to Aug.; the venison is somewhat inferior. The mating season is in July to Aug.; the young are born in the following May and June.

Roehampton, originally a hamlet in Putney (q.v.), and therefore now part of the metropolitan bor. of Wandsworth, London. It was once a centre of aristocratic residence, and sev. fine Georgian houses survive. It has a park adjoining Putney Heath.

Roehm, Ernst, see RÖHM.

Roelants, Maurics (1895-), Flem. poet and novelist, b. Ghent. He is one of the few outstanding Flem. authors of the period between the 2 world wars. His subtle and melancholic poems are full of sympathy with suffering humanity: *Het vernaken*, 1930, and *Pygmalion*, 1947. In his novels he shows himself a fine psychoanalyst: *Komen en gaan*, 1927, *De Jazz-Speler*, 1928, *Het Leven dat wij droomden*, 1931, *Alles komt terecht*, 1937, and *Altijd opnieuw*, 1943. Some of his works are trans. into French, German, and English.

Roelas, Juan de Las (1560-1625), Sp. painter, b. Seville. He pursued his artistic studies in Venice, and his works show the influence of Tintoretto. Among his best pictures are: 'The Death of St Ildore' (at Seville), 'The Martyrdom of St Andrew', and 'St James at the Battle of Clavijo.' Zurbaran (q.v.) was his pupil.

Roer, see RUHR.

Roermond, mrkt-tn in the prov. of Limburg, Netherlands, on the R. Meuse, 28 m. NNE. of Maastricht. The chief industries are the manuf. of cotton and woollen goods and tobacco, and dyeing. There is some fine carving in the 13th-cent. Romanesque Munsterkerk (minster). R. was the objective of very severe attacks by the Allies against the Germans in Nov. and Dec. 1944. Pop. 25,077.

Roesselaere (Fr. Roulers), tn in the prov. of W. Flanders, Belgium, 12 m. NW. of Courtrai. A famous weaving centre in the Middle Ages, it now cultivates flax and manufs. lace, linen, gloves, carpets, pottery, tiles, and chicory. It is situated on the R. Mandel, a trib. of the Lys, and is connected with the latter by a canal. During the Second World War R. was an important Ger. communications centre and suffered much from repeated Allied bombing. Pop. (1955) 34,000.

Roestone, see OOLITE.

Rogaland, co. of SW. Norway. It is a leading agric. area. There is also considerable industry. Stavanger is the cap. and port. Area 3545 sq. m. Pop. 211,200.

Rogation Days (Lat. *rogare*, to ask), in the Rom. Catholic Church 25 April (the Greater Litanies) and the 3 days preceding Ascension Day (the Lesser Litanies), so-called because the Litany is on these days chanted in procession if possible outside the church, and often around the crops. In connection with the procession a special Rogation Mass is appointed to be said. Violet vestments are worn, as it is a penitential supplication as well as a petition for God's blessing on the fruits of the earth. The Lesser Litanies originated at Vienne in Dauphiny under St Mamertus in the 5th cent., and were introduced at Rome by Leo III in 816. The Greater Litanies originated at Rome as a Christian substitute for the Pagan *Robigalia*, a procession to placate Robigo, the Frost deity. The Anglican Book of Common Prayer retains the Lesser Rogations only, among the days of fasting and abstinence. A Rogation procession has in some places been revived among Anglicans. *See also* LITANY.

Roger I (1031-1101), count of Sicily, b. Normandy, son of Tancred de Hauteville. In 1058 he went to Italy and succeeded in obtaining Calabria for his brother, Robert Guiscard. In 1060 he crossed to Sicily, and there conquered the Saracens, eventually being made count of Sicily by his brother, to whose possessions he succeeded after his death in 1085. *See* life by E. Curtis, 1913.

Roger II (c. 1093-1154), King of Sicily, son of Roger I (q.v.). In 1127 he became the ruler of Apulia owing to the death of Robert Guiscard's grandson, and this he added to his domains of Calabria and Sicily. In 1139 he captured Pope Innocent II, and the conditions of his release secured R.'s recognition as King of Sicily. He also attacked the Byzantine Empire in 1146, and conquered parts of Greece and Africa. *See* life by E. Caspar, 1904.

Roger, Pierre, see GREGORY XI.

Roger de Coverley, Sir, type of an Eng. country gentleman portrayed by Steele and Addison (qq.v.). The dance of this name, said to have been invented by the great-grandfather of Roger de Coverley, or Roger of Cowley, near Oxford, is a type of Eng. country long dance which includes the figure of threading-the-needle. Possibly originating in Scandinavia, a form of it seems to have existed in the early 17th cent. among the dances brought to court. As a social dance it achieved its greatest popularity during the 19th cent., being listed with waltzes, polkas, and the schottische in Thomas Wilson's *The Art of Dancing*, 1852.

Roger of Palermo (Roger of Salerno) (c. 1170), It. surgeon, taught surgery at the famous School of Salerno. About 1170 he wrote the first medieval textbook of surgery, which was a standard text for over a cent. and one of the most important works emanating from Salerno. He described an operation for hernia and the treatment of head injuries.

Roger of Salisbury (d. 1139), Anglo-Norman cleric and justiciar, the most noted member of a family of 'curiales-bishops.' He was originally a priest of Caen. A chronicler states that he attracted Henry I's attention by the speed at which he could say Mass. R. became Henry's chaplain, and, after Henry's accession, was made chancellor, Bishop of Salisbury, and justiciar. He is said to have created the elaborate system of the medieval Eng. exchequer described in the *Dialogus de Scaccario* by Richard Fitz-Nigel, treasurer from 1160 to 1198; if his actual role was less definite, it seems certain that he played a vital part in the systematisation of the financial machinery. His power became very great, and when Stephen rashly attempted to curb his family's privileges, R. was able to swing the weight of Eng. eccles. opinion decisively against him. R. was efficient, ruthless, and extremely acquisitive, but there is little evidence that he had any real religious zeal, though under his episcopate Salisbury Cathedral was much enlarged. See W. Stubbs, *Select Charters of English Constitutional History*, 1870; R. L. Poole, *The Exchequer in the Twelfth Century*, 1912.

Roger of Wendover (d. c. 1236), chronicler and monk of St Albans. His chief work is the *Flores Historiarum*. The section from 1202 to 1236 is valuable for the light it throws on events in John's reign and during the minority of Henry III (ed. by H. G. Hewlett, 1886-9).

Rogers, James Edwin Thorold (1823-90), political economist, b. W. Meon, Hants, and educ. at King's College, London, and at Oxford, becoming Drummond prof. of political economy there (1862-7). His chief works are *History of Agriculture and Prices in England*, 1866, *Six Centuries of Work and Wages*, 1885, *First Nine Years of the Bank of England*, 1887, *The Economic Interpretation of History*, 1888. His theories on 14th cent. England have been largely discredited by later historians.

Rogers, John (c. 1500-55), divine, b. Aston, Birmingham. He was ordained priest, but abandoned the Catholic faith and became a pastor at Wittenberg (1537). Under Edward VI he held various appointments in London and was a prebendary of St Paul's. He was imprisoned for his views and outspoken preaching in Mary's reign, condemned by Gardiner and Bonner, and burned at Smithfield. R. prepared 'Matthew's' Bible from the version of Tyndale and Coverdale. See life by L. Chester, 1861, and J. Foze, *Actes and Monuments*, 1563.

Rogers, Robert (1727-1800), an Amer. soldier, b. in New Hampshire of Irish parentage. Served in the French and Indian wars in command of 'Rogers' Rangers.' In 1776 he was appointed governor of Michilamackinac, but was accused of treachery and sent to Montreal in irons. He was acquitted, and went to England in 1769. During the War of Independence he recruited and commanded a loyalist regiment. He published a *Concise Account of North America*, 1765. See F. B. Hough, ed., *Journal of Major Robert Rogers*, 1883; Lt.-Col. H. M. Jackson, *Rogers' Rangers*, 1953.

Rogers' Pass, mt pass in Brit. Columbia, Canada, by which the Canadian Pacific Railway crosses the Selkirk Mts. Height 4275 ft.

Rogers, Samuel (1763-1855), poet and conversationalist, b. Stoke Newington, London. He entered his father's bank, becoming head of it in 1793. In 1781 he began to contribute verses to the *Gentleman's Magazine*. In 1792 he pub. *The Pleasures of Memory*, and among his other works were *Columbus*, 1810, *Jacqueline*, 1814, and *Human Life*, 1819. He was highly esteemed as a poet by contemporaries, and in 1850, on the death of Wordsworth, was offered the laureateship, which he declined; but his work is not now widely read. He is remembered chiefly as a conversationalist; his breakfast parties were famous, and Fox, Sheridan, Moore, Byron, and Wordsworth were among his friends. At his house in St James's Place, overlooking the Green Park, he began a famous art collection and library. His literary work lacks original inspiration, but has style and taste. His *Recollections* were pub. in 1856, and his *Table-Talk* 4 years later. See P. W. Claydon, *Rogers and his Contemporaries*, 1889; R. E. Roberts, *Samuel Rogers and his Circle*, 1910.

Rogerstone, tn of Monmouthshire, England, 3 m. W. of Newport, with a large aluminium factory. Pop. 5500.

Roget, Peter Mark (1779-1869), physician and lexicographer, b. London and educ. Edinburgh Univ. He became prof. of physiology at the Royal Institution, but is chiefly remembered as the author of a *Thesaurus of English Words and Phrases*, 1852. This was enlarged by his son J. L. Roget (1879). R. also wrote an introductory *Lecture on Human and Comparative Physiology*, 1826, treatises on *Electricity, Galvanism, Magnetism, and Electro-Magnetism* for the Library of

Useful Knowledge, 1832, and *Animal and Vegetable Physiology considered with reference to Natural Theology*, 1834. In 1824 R. discovered the phenomena of persistence of vision. He also helped to establish a univ. in London.

Roggeveld, mt range of SW. Cape of Good Hope, forming part of the watershed between the Olifants and Orange R.s. The range (100 m. long, 5000 ft high) continues E. into the Nieuveveld range.

Rogier (Roger) van der Weyden, or Rogier de la Pasture (c. 1400-64), Flem. painter, b. Tournai, probably the pupil of Robert Campin. In 1436 he became official painter to Brussels city. In this capacity he painted the altar-piece for the Chamber of Justice in the *hôtel de ville*. This was destroyed in the 17th cent., but accounts make it clear that already the naturalist characteristics of R.'s main works were apparent, though the subject, the story of Herkenbald, was quite medieval. R.'s 'Last Judgment' is in the museum of the hospital at Beaune. Authorities consider that he may have had the help of Dirk Bouts and Memlinc in this painting; the portraiture is superb, and the skilful composition and rich colouring place it among the finest of R.'s work. R. was perhaps more of a medieval painter than the Van Eycks. He worked within the old subject framework, but evolved a new technique of composition and proportion, while retaining the traditional scenery, expressions, and postures. In his ability to portray suffering R. surpasses all his Flem. contemporaries. He had a busy workshop at Brussels, and though he signed no pictures, the products of his studio are in many of the world's galleries. His influence was dominant in Flanders and N. Europe during the second half of the 15th cent. See lives by F. Winkler, 1913; J. Huizinga, 1930; J. Deestré, 1930; O. Kerber, 1936; E. Fidler, 1938.

Rogue, see VAGRANTS.

Rogue Money, in old Scots law, co. assessment, now abolished, to defray the cost of arresting, prosecuting, and maintaining criminals.

Rohan, name of a famous Fr. family with many distinguished members. The name is derived from R., a small tn. in Brittany. The best-known members of this family are:

Henri, Duc de Rohan (1579-1638), Fr. Protestant soldier, b. Blain, Brittany. He led the Fr. Huguenots in their insurrections against the Catholics. He married the daughter of Sully, the minister of Henry IV. He was made marshal of France by Louis XIII, and d. from wounds received fighting against the Imperialists in the Thirty Years War.

Louis René Edouard, Prince de Rohan-Guéméné (1734-1803), Fr. cardinal and diplomat, b. Paris, and educ. at the St Magloire seminary. His uncle, Constantin de R., Bishop of Strasburg, chose him as his coadjutor. He became a cardinal, 1778. He was made ambas.-extraordinary at the court of Vienna, but

alienated the favour of Maria Theresa by his scandalous mode of living, and was recalled. His name is associated with the affair of the diamond necklace, in connection with which he was imprisoned.

Other members of the R. family included *Hercules de Rohan*, Duke of Montbazou, and *Armand de Rohan*, the cardinal of Soublise (see SOUBLISSE).

Rohe, Ludwig Mies Van der, see VAN DER ROHE, LUDWIG MIES.

Rohillas, hill tribe of Afghanistan who, in the middle of the 18th cent., raided and settled in Rohilkhand, India. The ruler of Oudh, with the assistance of the East India Company, succeeded in expelling them in 1774. They were expert horsemen. See Sir J. Strachey, *Hastings and the Rohilla War*, 1892.

Rohlf, Gerhard Friedrich (1834-96), Ger. explorer, b. Vegesack. He studied medicine, then joined the Fr. foreign legion in Algeria (1855-60), and in 1861 began a series of journeys and explorations in N. and Central Africa, beginning with Morocco (1861-2). His numerous works of travel include: *Reise durch Marokko*, 1868, *Im Auftrag des Königs von Preussen . . . in Aethiopien*, 1869, *Land und Volk in Afrika*, 1870, 1884, *Von Tripolis nach Alexandria*, 1871, *Drei Monate in der Libyschen Wüste*, 1875, *Beiträge zur Entdeckung und Erforschung Afrikas*, 1876, *Neue Beiträge*, 1881, and *Quid novi ex Africa?*, 1886. R. travelled in America also (1875-6), was appointed consul at Zanzibar by Bismarck (1885), but was recalled. See life by K. Gunther, 1912.

Röhm, or Roehm, Ernst (1887-1934), Ger. politician, b. Munich. He became a professional soldier, and was commissioned just before the First World War. Later he was involved in von Epp's plot against the left-wing gov. at Munich. R. was one of the original members of the National Socialist party, and an intimate friend of Hitler. He was jailed for his part in the *putsch* of Nov. 1923, and afterwards went to Bolivia and served in the army there. In 1931 he became Hitler's chief of staff and leader of the S.A. and S.S. He was shot during the purge of 30 June 1934 on charges of plotting against Hitler (q.v.).

Roides, Emmanouel, see GREEK LITERATURE, Modern.

Rois Fainéants, Les, see FAINEANTS.

Rojas Zorilla, Francisco de (1607-48), Sp. dramatist, b. Toledo, a contemporary of Calderón, who influenced much of his work. Among his chief plays are *García del Castañar*, *Lo que son Mujeres*, *Entre bobos anda el juego*, showing a delightful humour and naturalness. T. Corneille, Scarron, and Lesage often borrowed from his plots. See E. Cotarelo y Mori, *Don F. de Rojas Zorilla*, 1911.

Rokitanaky, Karl, Baron von (1804-78), Czech pathologist, b. Königgrätz, founded the Ger. school of anatomical pathology, and occupied with great distinction the chair of pathology at the univ. of Vienna from 1844 to 1875. At the same time he was head surgeon of the

Central Hospital in Vienna. His principal work is *Lehrbuch der pathologischen Anatomie*, 1842-6.

Rokossovsky, Konstantin (1887-), Russian soldier, b. Warsaw, which he left in 1914 as a Russian conscript. During the revolution of 1917 he joined the Bolsheviks. At the outbreak of hostilities between the Soviet Union and Germany in 1941, R., as a lieutenant-gen., commanded one of the armies defending Moscow. R. later commanded the divs. that encircled the army of von Paulus at Stalingrad (Nov. 1942-Jan. 1943). His group of armies took a leading part in the Russian summer offensive of 23 June-31 Aug. 1944, planned in operational liaison with the W. allies, R.'s armies being concentrated in White Russia in the Pripiet marshes. His great victory in these operations was that of Bobruisk, where, in 5 days' fighting on the S. part of the central zone, he utterly defeated the Ger. Ninth Army. For this great success and masterly manoeuvring he was promoted marshal of the Soviet Union. R. was in command of the Soviet armies on the Vistula at the time of the Polish underground rising under Gen. Bor in Warsaw, when requests from the British and Americans for the use of Soviet airfields for supplying the insurrection were refused. He directed operations in Poland and took part in the conquest of E. Prussia as commander of the First and Second White Russian armies. He was Polish Defence Minister and chief of the Polish armed forces from 1949 until 1956, and Deputy Prime Minister of Poland 1952-6. He returned to Russia in 1956 to become Deputy Minister of Defence.

Rokyana, Johannes (c. 1397-1471), Bohemian Calixtine or Utraquist (name given in 1420 to the Calixtines because they received the Eucharist in both kinds) leader, b. Rokycany. In 1433 he was a Bohemian delegate at the Council of Basel, and became rector of Prague Univ. in 1438. His life was devoted to an attempt to achieve a reconciliation with Rome, while preserving the essentials of Utraquism.

Roland, Chanson de, epic poem of the Carolingian cycle, dating from the 11th cent. Its lofty and courageous tone marks it out as the greatest heroic poem of the Romance period. It is probably of Norman origin. The story related in the *chanson* deals with the battle of Roncevaux, here represented as a piece of strategy on the part of the Saracen king, Marsile, who planned thereby to kill Roland, the hero of the *chanson*, and nephew of Charlemagne. In this he is successful, and Roland, Oliver, and Archbishop Turpin perish after making a gallant stand against the enemy. Before he dies R. blows his ivory horn, which Charlemagne hears, though he is 30 leagues away. He hastens to the scene with his army, but is too late to save his nephew, though he avenges his death by inflicting defeat on the Saracens. See modern Fr. ed. by L. Gauthier (Eng. trans. by C. Scott-Moncrieff, 1920).

Roland de la Platière, Jean Marie (1734-93), Fr. statesman, b. Thiry. In 1781 he married Mlle Philpon. Directly after his marriage R. became industrial inspector at Amiens, and in 1784 was appointed inspector-general at Lyons, and later delegate from Lyons to the Constituent Assembly. He and his wife appeared in Paris early in 1791 and remained there for 7 months, making influential friends of the noted Republican leaders, including Buzot, Robespierre, and Brissot. In 1792 R. became minister of the interior, but his views were less extreme than those of the leading revolutionaries. He attacked Robespierre and others, resigning office at the beginning of 1793, shortly after the king's execution. Mme R. was arrested and guillotined. R. managed to escape, but took his own life.

Roland de la Platière, Marie Jeanne Philpon (1754-93), Fr. writer and revolutionary, wife of Jean Marie R. (q.v.). She was b. in Paris, the daughter of an engraver there. She welcomed the revolution and inspired the Girondist party, but on the decline of the latter was arrested and guillotined after 5 months' imprisonment. During this time she wrote her famous *Mémoires* (see ed. by C. Perroud, 1905), which reveal her as an acutely intelligent and talented woman. See also lives by Una Pope-Hennessy, 1917; C. Young, 1930; M. P. Willcocks, 1936.

Roland-Holst, Adriaan (1888-), Dutch poet, b. Amsterdam. He studied at Oxford, and the influence of Shelley and Yeats on his verse is unmistakable. He lives near the sea, and this, too, has left a mark on his writings. His rhythm is broad, his main symbols are the wind, the rain, the water, and the gulls. Among his works are *De Helijden van de Stille*, 1913, *Voorbij de Wegen*, 1920, *De wilde Kim*, 1925, *Een Winter aan Zee*, 1937, *Tegen de Wereld*, 1947, and *In Ballingschap*, 1948. See W. H. Stenfort Kroese, *De mythe van A. Roland-Holst*, 1951.

Roland Holst-van der Schalk, Henriette (1869-1952), Dutch poet, b. Noordwijk, near Leyden. She was without doubt the greatest living woman poet of the Low Countries. She was a zealous adherent of the Socialist cause, and later became a member of the Dutch Communist party. Finally, when she grew disillusioned, the mystic-religious character of her poetry predominated. Always, however, her work was of extraordinary lyrical value. Her most important publs. were *De Vrouw in het Woud*, 1913, *Verzonken Grenzen*, 1918, *Tusschen twee Werelden*, 1923, *Tusschen Tijd en Eeuwigheid*, 1934, *Uit de Diepte*, 1946, and *Een Requiem voor Ghandi*, 1948. She has also written sev. biographies, studies on social subjects, and dramas in verse. See J. F. van Praag, *Leven en werk van H. Roland Holst-van der Schalk*, 1946.

Rolandseck, Ger. vil. in the Land of North Rhine-Westphalia (q.v.), on the l. b. of the Rhine, opposite Honnef (q.v.). Its ruined castle stands 340 ft above the riv.

Rolf, see ROLLO.

Rolle, Frederick William, who called himself Baron Corvo (1860-1913), novelist, b. London. At 26 he became a Rom. Catholic, and studied for the priesthood, but gave that up and led a precarious roving life. He pub. 2 collections of short stories, *Stories Told Me*, 1898, and *In His Own Image*, 1901. *Hadrian VII*, 1904, and *Don Turgenio*, 1905, are novels. *Chronicles of the House of Borgia* appeared in 1901. He was the subject of a brilliant biography by A. J. A. Symons, *The Quest for Corvo*, 1934.

Roll, Alfred Philippe (1847-1919), French genre and portrait painter of the naturalistic school, pupil of Harpignies, Gérôme, and Bonnat. He was noted for his pictures of peasant and popular life and some studies of the nude in the open air. His pictures include: 'The Miners' Strike,' 1880, 'Work,' 1885, 'Manda Lamétrie, fermière,' 1888, 'Woman with a Bull,' 1889. R. also executed 'Jules de la Vie' and 'Jeunesse en Rose,' decorative paintings for the Paris Hôtel-de-Ville (1892-1905). See Fourcaud, *L'Œuvre de A. P. Roll*, 1896.

Rolland, Romain (1866-1944), Fr. author, b. Clamecy, and educ. there and at the Ecole Normale, Paris, and, later, in Rome. He returned to the Ecole Normale as lecturer on the hist. of art, and in 1903 went to the Sorbonne as prof. of the hist. of music. It was in musical hist. indeed that he achieved his first great success, with his biography *Beethoven*, 1903. This paved the way for the pub., in 1904, of the first of his studies of the life of an imaginary musician in *Jean-Christophe*, evolved from the ideals of the period of Ger. culture represented by Beethoven and Goethe. Ten vols. came out between 1904 and 1912. For this remarkable work R. was awarded the Nobel prize for literature in 1915 and the Fr. Academy's Grand Prix for literature. During the First World War he occasioned much controversy, especially by his *Au-dessus de la mêlée*, 1915, and other collections of articles in the *Journal de Genève*, in which his uncompromisingly pacifist efforts to judge the war objectively led to accusations that he was pro-Ger. After the war he turned to irony, either a light, lambent irony as in *Liliut*, 1919, or the more serious irony of *Clerambault*, 1918, the 'history of a free conscience during the war.' But bitterness was not in his nature, as is shown in the tender sentiment of his love story *Pierre et Luce*, 1919, and in the noble compassion of the study of the Gk philosopher, *Empédocle d'Agigente et l'âge de la haine*, Paris, 1918.

Later books on the Indian thinkers and religious leaders, such as his *Mahatma Gandhi*, 1924, were widely read in the E. but less known in France. Of his plays both *Danton*, 1901, and *Le 14 Juillet*, 1902, could be appreciated by select Fr. audiences, but the French as a whole did not regard them highly, perhaps owing to their didactic tendencies. His *Charles Péguy* (2 vols.), 1942, presents, in a

masterpiece of writing, all that is best in the life and work of the great Fr. moralist and critic. See lives by J. Bonnerot, 1921; S. Zweig, 1921; C. Senechal, 1933; also A. R. Levy, *L'idéalisme de R. Rolland*, 1946.

Rolle, Richard (c. 1300-49), Eng. hermit, poet, and mystic, b. Thornton, Yorks. Though a brilliant scholar (he studied theology at Oxford), he forsook the barren scholasticism of the univ. of his day and became a hermit at Hampole, near Doncaster, describing his mystical experiences in both Latin and the vernacular. He typified the 14th cent. desire to gain religious satisfaction through faith, rather than by way of the hair-splitting dialectic of the schools. His vernacular writings are extremely beautiful, and his treatises in English and trans. of the Psalms were widely read by laymen. His Eng. writings have been ed. by Hope E. Allen, 1931. See life by Francis M. M. Compier, 1929; and T. W. Coleman, *English Mystics of the Fourteenth Century*, 1938.

Roller Bearing, see BALL BEARINGS.

Roller Skating, see SKATING.

Rollers, name given to any species of Coraciidae on account of the curious habit of both male and female birds of rolling over when in flight. These birds occur exclusively in the Old World, and are found in the woods of hilly districts.

Rolleston, Sir Humphry Davy (1862-1944), physician, b. Oxford and educ. at Marlborough, St John's College, Cambridge, and St Bartholomew's Hospital. He was physician to St George's Hospital, London, from 1898 to 1919, and then emeritus physician. R. became distinguished as a consultant, and was co-editor of Sir Clifford Allbutt's *System of Medicine* (2nd ed.). Other major editorial work included the *British Encyclopaedia of Medical Practice*, 1936-43, and the main direction of the medical periodical *The Practitioner*, 1928-44. He succeeded Allbutt as regius prof. of medicine at Cambridge in 1925 (until 1932) and was president of the Royal College of Physicians, 1922-6. He was physician to King George V from 1923 to 1932 and physician-extraordinary, 1932-6. He was knighted in 1919 and created baronet in 1924. R.'s historical and bibliographical works are a lasting contribution to medicine. Among them are *Internal Medicine*, 1932, *The Cambridge Medical School*, 1932, *The Two Heberdens*, 1933, and *The Endocrine Organs*, 1936, an exhaustive history. Other works include *Diseases of the Liver, Gall-Bladder and Bile Ducts*, 1905, *Medical Aspects of Old Age*, 1922, and a biography of Allbutt, 1929.

Rolleston, Thomas William (1857-1920), Irish author, b. Glasnevin, Shinnone, co. Offaly. He was educ. at Rathfarnham and Trinity College, Dublin. He played a leading part in the Irish literary revival: he was joint editor of *The Treasury of Irish Poetry*, 1900, and pub. *Imagination and Art in Gaelic Literature*, 1900, and *Myths and Legends of the Celtic Race*,

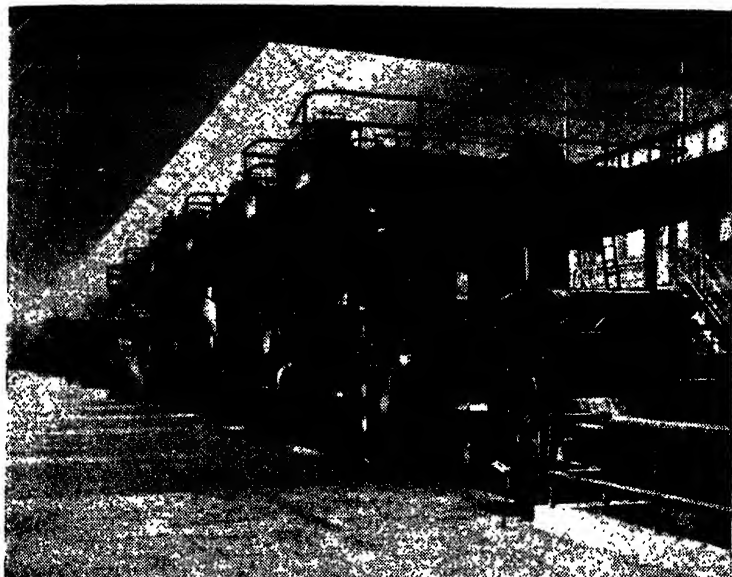
1811. Other pubs. include *Sea Spray*, 1909, a vol. of verse, and a life of Lessing, 1889.

Rollier, Auguste (1874-1954), Swiss physician, b. St. Aubin. R. was a pioneer in the treatment of tuberculosis by heliotherapy, and his clinic in Leysin gained a world-famous reputation.

Rollin, see LEDRU-ROLLIN.

Rollin, Charles (1661-1741), Fr. historian, b. Paris. In 1688 he became prof. of eloquence in the College de France,

ensure an even thickness. In 1615 de Caus erected a mill to roll sheets of tin and lead for organ pipes. As with all other primitive processes, these mills were driven by hand power. Branca, a Rom. engineer, designed a power-driven mill in 1629. It is doubtful if it ever worked, but the idea of using the hot-air currents from a blacksmith's forge to drive a wheel, and further to use gearing to assist, was ingenious. In 1728 John Payne and Maj. Hanbury of Pontypool



Richard Thomas & Baldwins Ltd.

ROLLING MILL

The six-stand continuous hot-strip mill—the last stage of rolling on the half-mile-long hot mill at Ebbw Vale works.

and in 1694 rector of the univ. of Paris, to which he was re-elected in 1720. He exercised great influence on Fr. univ. thought and life. He pub. an ed. of Quintilian, 1715, *Traité des études*, 1726-31, and an *Histoire ancienne* (13 vols.), 1730-8.

Rolling Mills. In early times malleable iron was generally hammered down into shape. R. M. were later used to replace the older water tilt-hammers and steam-hammers. Although modern rolling may be said to have originated with Cort's (q.v.) invention of grooved rolls in 1784, rolling was practised for many years before this. There is evidence that a Frenchman, Pruller, passed gold and silver between rolls in 1553 in order to

were granted a patent for rolling tinplates, instead of the previous method of hammering. Early in the 18th cent. a Swede by the name of Polhem suggested placing 2 small rolls between 2 large ones, thus anticipating the modern 4-high mill fully 200 years before it had received any considerable attention. The only other outstanding advance in the design of rolls prior to the steel era is Cort's invention. The discoveries of James Watt and subsequent workers caused the development of the steam engine, which has been the main source of power for driving mills during the past cent.

When steel-making commenced the engines employed were all of the beam type, running at low speeds with low-

pressure steam, usually throttled by small pipes and faulty valves, so that in spite of their imposing dimensions they really gave very little power. In order to prevent the mill being pulled up or 'stalled,' as the men call it, a heavy flywheel was necessary. As a consequence these early mills were an imposing sight, but were not capable of much hard work. The beam was replaced by direct-acting engines, in which the crankshaft was connected straight through to the main shaft of the rolling mill. Subsequent developments of mill engines using steam for steelworks rolling have taken place along the lines of the 2- and 3-cylinder high-pressure type. In some cases compound steam engines are in use.

Electrically driven reversing motors for 'cogging,' that is the first stage of roughing down the ingot, were first tried in Austria in 1850, and have found extensive application in modern steelworks. Modern practice is based almost exclusively on the use of electrical power. These developments have probably constituted the outstanding features in steel and non-ferrous metal-rolling practice. See IRON AND STEEL.

Rolling Stock, see RAILWAYS.

Rollo, Rolf, or Rou (d. 932), Duke of Normandy, son of Rognvald of Norway. About 875 he left Norway on a marauding expedition, and in 876 sailed up the Seine to Rouen. He besieged Paris in 886. In 912 he was baptised at Rouen and given the title subsequently known as Normandy (q.v.). He settled there and ruled justly and capably, abdicating in favour of his son Wm in 927. He was the ancestor of the later sovereigns of England.

Rollook, or Rollok, Robert (c. 1555-99), lecturer and minister, first prin. ('regent') of Edinburgh Univ. (1583). He was prof. of philosophy and regent at St Andrews (1580-3), prof. of theology at Edinburgh Univ. (1587), and moderator of the General Assembly at Dundee (1597). R. wrote biblical commentaries and other religious works.

Rolright, Great and Little, 2 adjacent vills. and pars. of Oxon., England, 11 m. SW. of Banbury. Between Great R. and Little R. are the R. Stones, a famous megalithic structure, consisting of the King Stone, the King's Men, a circle of some 70 standing stones which may have been a Druid temple, and the Whispering Knights, the remains of a burial chamber, or perhaps the markers of a prehistoric survey. Great R. par. church dates from before 1200. Pop. (Great R.) 299; (Little R.) 32.

Rolls, Charles Stewart, see ROLLS-ROYCE LTD.

Rolle, Keeper of the, see KEEPER.

Rolle, Master of the, keeper of the records and head of the Record Office, ranking after the lord chancellor and the lord chief justice of England. Originally an officer of the court and chief of the masters in chancery, he is now the president of the chancery div. of the high court of justice in England. He was

formerly capable of being elected an M.P., but this privilege was abrogated in 1873. See PUBLIC RECORD OFFICE.

Rolls-Royce Ltd. Henry Royce (1863-1933) and the Hon. C. S. Rolls (1877-1910) first met in 1904 when the firm of F. H. Royce and Company was in being, producing Royce cars to the design of the great engineer. The firm of C. S. Rolls & Company were at that time well estab. in London, as dealers in high-grade continental cars, but with the advent of the Royce car they changed their policy, and in 1906 they founded R.-R. Ltd. Rolls was an enthusiastic balloonist before becoming a prominent pioneer aeroplane pilot. He was the first to fly the Channel from England to France and (on the same occasion) to make the double crossing (1910). He crashed and was killed at the Bournemouth aviation meeting (11 July 1910), the first Brit. powered-aeroplane pilot to die flying.

The first R.-R. factory was built at Derby and opened on 9 July 1908. The floor space of some 48,000 sq. ft. has now grown to 982,000 sq. ft. As the fame of the car spread throughout the world depots were opened in many countries, each in the charge of men trained in Derby. During the First World War contracts were accepted for the design and manuf. of complete aero engines.

Between the wars the company prospered in many directions, and a flight development estab. was started at Hucknall, Notts. Factories were built at Crewe and Glasgow, and before the end of the Second World War the personnel employed totalled 57,000. It is now well known that R.-R. played an important part in the development of the Whittle jet-propulsion aero engine. R.-R. jet-propulsion engines to the Whittle design were in operational service during the last year of the war and are now manufactured under licence in the U.S.A., Australia, France, Argentina, and Belgium.

Roma, see ROME.

Romagna, dist. in Italy, the E. part of Emilia-Romagna (q.v.), formerly part of the States of the Church (q.v.). The dist. sometimes comprised the provs. of Bologna, Ferrara, Forlì, and Ravenna (qq.v.), sometimes only Forlì, Ravenna, and part of Bologna.

Romaic (*Romaikos*, Rom., Byzantine), or Neo-Hellenic, the literary language of modern Greece. It is a development of Byzantine Greek rather than of the classical Gk language. Unfortunately no Gk Dante or Petrarch or Chaucer arose to transform the Gk vernacular and the 'literary' language into a fixed form of literary language. Prochoprodromos or Prodromus wrote in this tongue in the 12th cent.: he wrote 2 R. poems addressed to the Emperor Manuel Comnenus. See R. Nicolai, *Geschichte der neugriechischen Literatur*, 1876; A. R. Rangabé, *Précis d'une histoire de la littérature néo-hellénique*, 1877, and with D. H. Sanders, *Geschichte der neugriechischen Literatur von ihren Anfängen bis auf die neuere Zeit*, 1884; E. Legrand, *Bibliothèque grecque vulgaire*

(8 vols.), 1880-96; C. Krumbacher, *Geschichte der byzantinischen Literatur* (2nd ed.), 1897; K. Dielerich, *Geschichte der byzantinischen und neugriechischen Literatur*, 1902.

Roma, goddess personifying the power of Rome, or rather the *Fortuna populi Romani*. The cult was due to oriental and Hellenistic influences; it was slow in establishing itself in Rome. Hadrian built a *templum urbis* to Venus and R. in the city. In Asia Minor the cult of R. was estab. in 195 BC, when Smyrna built a *templum urbis Romae* (Tacitus, *Annales*, iv. 56). Alabanda (Caria) in 170 BC not only had a temple of R., but also kept the *Romalia*, a feast which later on spread to Greece, Asia Minor, and Italy. Augustus, who reorganised the *commune Asiae*, officially introduced the cult of R. in the municipalities of Asia Minor. The temple of R. at Athens is of his period (*Inscr. Graec.* iii. 1, 63). On the acropolis of Puteoli (Pozzuoli, near Naples) there was a temple dedicated to R. and Augustus.

Roma, tn in Queensland, Australia, 318 m. W. by rail from Brisbane. It is in a pastoral (sheep and cattle) and agric. area; citrus fruits are grown, and there are vineyards. Pop. 4258.

Romains, Jules (1885-), Fr. author, b. St Julien-Chapteuil, his real name being Louis Farigoule. He graduated from the Ecole Normale Supérieure, Paris, and taught philosophy for 10 years. In his early years he belonged to the group of young poets known as the 'Groupe de l'Abbaye'. R. was a founder of Unanimism (q.v.), on which he wrote *La Vie unanime*, 1908, a vol. of poems. R. became a successful playwright, showing technical skill and the ability to produce sophisticated, sparkling comedy, as in *Knock*, 1923. But his outstanding achievement was as a novelist, with *Les Copains*, 1913, and especially his series *Les Hommes de bonne volonté*, which extended to 27 vols. between 1932 and 1941, a 'continuous novel' attempting to survey realistically the whole panorama of contemporary life. The main characters appear, temporarily vanish, and appear again in a later vol., in an attempt to portray life objectively on a grand scale. R. went to America during the Second World War. In 1942 he pub. a life of Stefan Zweig, and again turned to drama in *Salvatore* *Discovers America*, 1942, a play which shows Shavian influence. He was elected to the Fr. Academy in 1946. See A. Cuisenier, *Jules Romains l'humanisme*, 1935; P. Brodin, *Les écrivains français de l'entre-deux guerres*, 1945.

Roman, or Romanu, tn of Moldavia, Rumania, in the prov. of Jassy, at the junctions of the R.s Moldava and Siret. There is a magnificent 16th-cent. cathedral, R. being the seat of a Rumanian Orthodox bishop. Pop (1930) 28,800.

Roman Africa, see TUNISIA, History.

Roman Army. The backbone of the R. A. was, and remained far into the 3rd cent. AD, the legion (q.v.). At the end of the 2nd cent. BC the legion was a citizen levy 4500 strong, composed of 30 maniples,

each divided into 2 centuries of heavy infantry, 3000 in all; 1200 *velites* or light infantry, who acted as skirmishers; and 300 cavalry in two *velilla*. A major reorganisation was instituted by Gaius Marius (q.v.), who formed a new army at once more proletarian and more professional, depending more closely upon its commander-in-chief. Marius increased the number of heavy infantry and altered their formation; he also abolished the *velites* and the citizen cavalry, and henceforward the legion was composed as follows. The heavy infantry, or legionaries proper, numbered 6000 men (though they were often much below strength) in 10 cohorts. The cohort of 600 men was the tactical unit; each was made up of 6 centuries. On active service one or more cohorts might be detached for various duties. Enlistment was for 20 years; equipment was uniform; and pay was 120 (raised by Caesar to 225) denarii a year. Under the commander-in-chief were the following officers. (a) The quaestor, who combined the duties of chief of staff and quartermaster general. (b) A staff (varying in number) of *legati*, of senatorial rank. Caesar was the first to place each legion under the immediate command of a *legatus*, though it should be noted that not every *legatus* was at all times so employed. (c) Six *tribuni militum* were attached to the legion, and commanded in rotation. By Caesar's time, however, many of them were mere place-seekers, most of whose duties were administrative; but the more efficient were often used by him to command cohorts, groups of cohorts, and even ships. (d) The centurions were officers who had risen from the ranks by sheer ability. Upon them the commander-in-chief principally relied in battle and for the maintenance of discipline at all times. Each of them commanded a century, so that there were 60 to the legion; and the senior centurion was he who commanded the leading century of No. 1 cohort.

Attached to the legion were units of auxiliary horse and foot, recruited outside Italy and commanded by *praefecti*, some of whom were native officers. The cavalry was mainly from Gaul, Germany, and Spain; the infantry were light armed troops, e.g. Balearic slingers and Cretan archers. This organisation remained substantially the same until the time of Diocletian (AD 284), except that Augustus incorporated a single *velillum* of 120 horsemen into each legion; however, they acted not as cavalry but as dispatch-riders and mounted orderlies. Under Augustus the legion was no longer commanded in rotation by the tribunes, but permanently by a *legatus*. Besides the legions Augustus also raised the *cohortes praetoriae*, of which there were 9—partly stationed permanently in Rome and partly accompanying the commander-in-chief wherever he went. Internal security was provided by cohorts of *vigiles*, who acted as police and firemen and were stationed both in Rome and in the larger prov. tns. Under the earlier

emperors there was no great military power inimical to Rome, and therefore no need for a field army. Apart from the praetorians and the *vigiles*, the only function of the Army was that of frontier defence against tribal raids. These were kept in check by the legions concentrated at strategic points behind the actual fortified frontier (*limes*), which was manned by auxiliaries. Augustus greatly expanded and reorganised these troops. They were formed into cohorts of infantry and *alae* of cavalry. While the praetorian and *vigiles* cohorts were 1000 strong, and the legionary cohorts 600, an auxiliary cohort might contain 10 centuries each of 100 men, or only 5 centuries of the same size. *Alae* could likewise be either 500 or 1000 strong, but were divided into 8 *vezilla* of 120 each. There were also mixed cohorts of 1 *vezillum* of horse and 4 centuries of foot, and mixed *alae peditatae* of 1 century and 3 *vezilla*, or twice that number in the same proportion. Colonels of auxiliaries were sometimes called *praefectus* instead of *tribunus*. This rank had previously been held by the squadron-leader of legionary cavalry under the rep. (*praefectus equitum*). There were also marines (*classici*) forming cohorts on the auxiliary model. The term *vezillatio* was not originally applied to a fighting unit, but meant either a draft of reinforcements or a working party responsible for a stretch of road or sector of fortification. But under the late empire barbarian mercenaries began to serve the empire under their own leaders, and both *vezillationes* and *cunei* were probably only vague names for native war-bands and not part of the Rom. organisation at all. After the time of Diocletian such bodies came to preponderate in the Army, and the legion, whose infantry strength had been slightly reduced by the introduction of field engines (*tormentae*, *ballistae*), which were not served by a separate corps of artillery but by detachments drawn from within the legion and the cohort, was further reduced in strength, though the number of legions remained the same. See G. L. Cheeseman, *The Auxilia of the Roman Army*, 1914; H. M. D. Parker, *The Roman Legions*, 1928.

Roman Art, see ARCHITECTURE, III; POTTERY, Rome; NUMISMATICS; PAINTING; and SCULPTURE.

Roman Britain, see BRITAIN, ROMAN, HISTORY OF; ROMAN REMAINS IN BRITAIN.

Roman Catholic Church. For the doctrine, nature, and hist. of the Catholic Church up to the Reformation (q.v.), see CHRISTIANITY; CHURCH HISTORY; PAPA-CY.

Organisation. In 1907 by the decree *Lamentabili* (Nos. 52-56), and parallel passages in an Encyclical letter *Pascendi dominici gregis*, Pius X repudiated the modern theory that Church authority comes not from Christ but from the common religious consciousness of the faithful. The R.C.C. teaches that Christ is the invisible head of the Church (Eph.

v. 23). He is represented on earth by the Bishop of Rome as successor to St Peter, 'the Rock,' on whom Christ built His Church, giving him the keys of the kingdom of heaven (Matt. xvi. 18, 19) and making him shepherd of the whole flock (John xxi. 15-17). The Bishop of Rome therefore has a primacy of honour and jurisdiction even over those oriental patriarchs who are in communion with him. The Vatican Council (1870) declared his authority to be everywhere *episcopal, ordinary, and immediate*. Nevertheless, it is normally exercised through the patriarchs (see C. Butler, *The Vatican Council*, 1930, ii. 10), metropolitans, and other bishops who rule local churches by ordinary jurisdiction. Oriental (see UNIAE) churches are directly responsible to their patriarch, but Rome is always the final court of appeal. In the W. dioceses, governed by bishops, are grouped into provs. under archbishops, called 'metropolitans'—though not all archbishops are metropolitans. These have little ordinary jurisdiction outside their own dioceses except the power to summon and preside over a provincial council. Some metropolitans are also cardinals (q.v.). The title primate is now almost obsolete. Missionary dists. are ruled by vicars-apostolic and prefects-apostolic as representatives of the Pope. Many religious orders and congregations are exempt from the jurisdiction of their local bishop, but they are responsible to him for any par. work they may have been entrusted with. The administration of the sacraments, except baptism and matrimony, is exclusively in the hands of the clergy. The ordination of bishops, priests, and deacons is a sacrament, though R. C. theologians debate as to whether the distinction of these orders is due to the personal intervention of Christ or not. The subdiaconate and the 4 minor orders of acolytes, exorcists, readers, and doorkeepers are of eccles. origin; some writers nevertheless admit their sacramental character: their reception is a necessary preliminary to the priesthood, but otherwise of little practical importance nowadays. The R. C. C. claims to be a perfect society, containing all the necessary means to achieve her end, the salvation of souls; receiving her authority directly from God through Christ, and entirely independent of civil authority (the State) with which she co-operates on an equal footing in 'mixed' matters—i.e. things pertaining to both jurisdictions. At the same time, as her aim (the salvation of souls) is higher than that of the State (the physical well-being of citizens), she claims the right to criticise and, if need be, condemn, legislation sacrificing the former to the latter object. By the Lateran Treaty, 1928, the Pope was recognised as sovereign of the Vatican City State, independent of the It. State. Many countries are in diplomatic relations with the Pope, papal representatives abroad being known as nuncios or legates.

The Roman Catholic Church in Modern Times. The Protestant Reformation was

essentially a denial of the claim of the R. C. C. to be the only authentic interpreter of Christianity to mankind, and consequently wherever it gained a footing, the R. C. C. ceased to exist. The first result of the spread of Protestantism in N. Europe was a series of bloody struggles between Protestant and Catholic states or between Protestant and Catholic factions within certain states. This phase ended with the Treaty of Westphalia (1648), which ended the war between the 2 religions in central Europe. This treaty marked the end of the attempt to settle the religious quarrel with the sword, and from then onwards Protestantism was an accepted phenomenon in Christendom. This recognition by the R. C. C. of a rival religion, though it did not produce religious toleration in the modern sense, led eventually to free thought and indifferetism in Rom. Catholic countries; and it was this so-called enlightenment which provided the philosophical basis for the Fr. Revolution, which was consequently marked by hostility to the R. C. C. This hostility was spread throughout Europe by the Fr. revolutionary and Napoleonic armies, leading to wholesale suppressions and confiscations of church property (notably in S. Germany), and from it stems the anticlericalism to be found in most European Rom. Catholic states to-day.

These 2 great disasters for Catholicism, viz. the Reformation (q.v.) and the Fr. Revolution (see FRANCE, *History*), have greatly affected the attitude of the R. C. C. to the modern world. From being co-extensive with W. Christendom and the unique exponent of Christianity in that sphere, she has been put on the defensive, and her hist. in modern times is largely that of an attempt to regain lost ground. Hence its 2 most important features are the re-establishment of Catholicism in Protestant countries and the intensification of missionary effort among non-Christians and in new countries, especially in N. America. For the hist. of the R. C. C. in France, see also FRANCIS DE SALES, ST; JANSENISM; MODERNISM; QUIETISM; VINCENT DE PAUL, ST.

The Roman Catholic Church in Modern England. In England for over 2 cents. after the Reformation the scattered Catholics were served by missionary priests (Englishmen trained on the Continent), whose activities were subject to penal laws. Toleration was officially extended to Catholics by the Catholic Emancipation Act of 1829, and in 1850 Pope Pius IX restored a Rom. Catholic episcopate to England and Wales, Nicholas Wiseman becoming first Archbishop of Westminster. In 1878 Leo XIII re-estab. the Rom. Catholic hierarchy in Scotland. There are now 19 Rom. Catholic episcopal sees in England and Wales, and 7 in Scotland. The estimated number of Rom. Catholics in England and Wales is about 3,000,000, and for Scotland 750,000. Most of the older religious orders of the R. C. C. have

now been re-estab. in Great Britain (e.g. Benedictines, Franciscans, Dominicans, Premonstratensians, Carthusians, Canons Regular), while many post-Reformation orders have likewise taken root (e.g. Jesuits, Passionists, Redemptorists, Rosminians, Salesians). A great impetus to the development of the R. C. C. in England in the 19th cent. was given by the flight of priests from France at the time of the Fr. Revolution and their migration to this country.

The Roman Catholic Church in the New World. The R. C. C. was introduced into S. America *pari passu* with its conquest and settlement by the European conquerors. The conversion of the natives was one of the primary objects of the latter, and this task was entrusted mainly to preaching friars sent from Europe, while the organisation of the new churches into dioceses was carried out by higher clergy, likewise sent from Europe and receiving their appointment from Rome. The result is that confessionally the R. C. C. in Latin America now forms a homogeneous regional bloc into which other forms of Christianity have not yet effected any serious penetration.

In what is now the U.S.A. the R. C. C. arrived late. During the colonial period there was no organised R. C. C. St Mary's, Maryland, was founded by Eng. and Irish Catholics in 1634, while Fr. Jesuits in the N. and Middle W. and Sp. friars in the Far W., conducted missions to the Indians. After the attainment of independence and the estab. of religious equality by the adoption of the Constitution (1787) the time was ripe for the organisation of the R. C. C. in the U.S.A. on a diocesan basis. The first Rom. Catholic bishop in the U.S.A. was John Carroll, consecrated Bishop of Baltimore in 1789. Thenceforward the diocesan organisation of the R. C. C. spread over the U.S.A., and there are now 130 dioceses divided into 25 eccles. provs. There are some 116 religious orders of men and 300 of women. The Rom. Catholic population of the U.S.A. is estimated (1953) at 30,425,015. The number of bishops is 192, and of priests 45,222.

In Canada the origins of Rom. Catholicism are naturally to be found among the Fr. colonists who settled the country from the 16th cent. onwards. The first Catholic mission to the Indians was estab. at Georgian Bay in 1626. The missions were mainly in the hands of the Jesuits and Franciscan Recollects, among whom several martyrdoms were suffered. The eccles. hierarchy was estab. in 1659, Bishop Laval-Montmorency being appointed by Pope Alexander VII Vicar Apostolic of New France. The first episcopal see was estab. at Quebec in 1674. With the cession of Canada to England by the treaty of Paris 1763, the Catholics in Canada entered upon a period of troubles in spite of the fact that the treaty had promised them religious freedom. The Bishop of Quebec was not officially recognised by the Brit. Gov., an

attempt was made to impose a Protestant education on the young, and religious communities of men were forbidden to accept new members. The growth of disaffection among the Amer. colonists farther S. induced the Brit. Gov. to grant religious liberty to the Fr. Canadians by the Quebec Act of 1774, with the result that, when the Amer. Revolution broke out, the Canadians refused to join the rebels. However, administrative pressure continued to be directed against the Catholics till the war of 1812 between Great Britain and the U.S.A. once more failed to break the loyalty of Canadian Catholics. The Catholic bishopric of Quebec was at last officially recognised, and other Catholic sees erected. Meanwhile, the W. had been opened up by Catholic missionaries, and the first bishopric there, that of St Boniface, was founded in 1847. Thenceforward, episcopal sees both in E. and W. Canada continued to increase. Canada now has 15 archbishoprics, 39 bishoprics, 9 vicariates apostolic, and 4 exarchates, and Rom. Catholics form more than half the pop.

Roman Catholic Missions in the Old World. Missionary work among the heathen has characterised the Church from St Paul's time onward, and it was only in early medieval times that Europe ceased to be the main theatre of Rom. Catholic missionary endeavour. With the disappearance of paganism from Europe the Western Church turned its attention to extra-European unbelievers, mainly the Moslems. The founding of the mendicant orders in the 13th cent. provided the Church with a body of men admirably adapted for mission work. For this purpose the Dominicans proceeded to study Arabic, while Raymond Lull, the Franciscan, persuaded the Pope to found colleges for the study of oriental languages in Rome, Paris, Oxford, and Bologna. Moreover, the Rule of St Francis specifically allowed mission work, and St Francis himself engaged in it. With the 15th cent. colonisation came the first brush between the Church and secular powers on the subject of missions, the Pope protesting against the ill-treatment of baptised natives. The Jesuits, whose society was founded in the 16th cent., undertook to go and preach the gospel wherever the Pope might send them, thus providing the Papacy with a body of missionaries under its own control. In 1542 the first college exclusively for missionaries was founded by the Jesuits at Coimbra. The Jesuit St Francis Xavier engaged in pioneer missionary work in India and the Far E. Meanwhile the nationalistic missionary work carried out by the Sp. and Portuguese Govs. in their colonies continued to draw forth protests from the Popes, who were particularly critical of the regimentation and enslavement of the natives, hasty baptisms, and the failure to train a native clergy.

It was the papal dissatisfaction with Sp. and Portuguese methods which led

eventually (1622) to the foundation in Rome of the Congregation of Propaganda (*de Propaganda Fide*), consisting of a committee of 13 cardinals with 2 secretaries. This was a central, papal, organisation, with full control over Rom. Catholic missions throughout the world, including those in Protestant countries, e.g. England. Rom. Catholic missions were directed by Propaganda throughout the 17th and 18th cents.; but with the Fr. Revolution a new problem arose, viz. that of finance. Hitherto the missions had been financed by the Catholic European govts. which controlled the area of their activities and by the religious orders engaged in the work; but with the secularisation of European govts. and the impoverishment of the religious orders, both a result of the Fr. Revolution, the main economic support of missionary activity was removed. The difficulty was met by the foundation of the Society for the Propagation of the Faith by Pauline Jaricot at Lyons (H.Q. now transferred to Rome) in 1818. This society consisted of layfolk who set aside a small sum weekly for the missions, and it developed so remarkably that in 100 years 500,000,000 francs were so subscribed. New religious orders devoted wholly to missionary work were now founded, e.g. the Congregation of the Immaculate Heart of Mary, Cardinal Lavigerie's White Fathers for Africa, and the Society of the Divine Word.

With the expansion of the missions, the Church in the mission-field received a better-defined juridical organisation. In 1908 England, Holland, and N. America were removed from the jurisdiction of Propaganda. At the present time the pattern of missionary development is as follows: the smallest unit is a 'station,' having at least 2 missionaries (under these there are often sub-stations, each run by a permanent catechist); a group of stations is eventually raised to the status of a prefecture apostolic and ultimately to a vicariate apostolic divided into quasi-parishes under priests; when the vicariate apostolic has sufficiently developed it becomes a diocese and is removed from the jurisdiction of Propaganda. For this development native collaboration is necessary, and the formation of native priesthoods is now one of the main aims of missionary work. See also *Missions*.

The total number of Rom. Catholics in the terr. controlled by Propaganda is 2,800,000; catechumens number 2,700,000; priests (foreign) 17,000, (native) 8000; brothers (foreign) 6500, (native) 2000; sisters (foreign) 83,600, (native) 21,300; catechists 81,000; teachers 80,000; doctors 500. Church buildings number 10,000, chapels 47,000, hospitals 950, dispensaries 3900, orphanages 2000, printing presses 200. All these totals are approximate.

The Irish Contribution. The spread of the Rom. Catholic faith in modern times has been promoted to a very remarkable degree by the missionary and colonising

activities of the Irish race. It is necessary therefore, that reference to these activities should be included in any account, however summary, of the contemporary R. C. C. In the first place, it must be noted that the Irish were, almost from their conversion (5th cent.), a race of missionaries. In the 6th and 7th cents. we find St Colomba evangelising Scotland, St Aidan, N. England, St Columbanus and his disciples founding monasteries in France and N. Italy, St Gall in Switzerland, and sev. other Irish saints labouring successfully in the Rhineland, N. France, S. Germany, and even S. Italy. However, it was the colonial era, from the 16th cent. onwards, that witnessed the most spectacular achievements of the Irish in spreading the Rom. Catholic religion. The R. C. C. in the U.S.A. is largely the result of the growth of Irish immigration. The fact that the earlier immigrants were forced to leave their native land for conscience' sake made it inevitable that they should be particularly zealous in practising and organising their religion in their new surroundings. Thus Cromwell's forcible mass transportation of Irish Catholics to N. America, followed as it was for 200 years by a steady stream of voluntary emigration for economic as well as religious reasons, sufficiently explains why the R. C. C. is the most numerous Christian denomination in the U.S.A. to-day. Its clergy are now predominantly of Irish blood, and its vigour, its apostolic zeal, and its uncompromising spirit are such as are associated with the great Irish missionaries of earlier times.

The growth of the R. C. C. in Australia presents a striking parallel to its early hist. in N. America. Here again the Irish played a predominant part and here again their presence in the colony was due originally to penal action on the part of the Eng. Gov. When in 1783 the N. American colonies were lost to England, the transportation of Brit. convicts was deflected to Australia, the penal settlement of Botany Bay being estab. in 1788. A large proportion of these convicts consisted of Irishmen sentenced for political or religious offences. In their new environment they were deprived of all religious facilities and forced to attend the Protestant services under penalty of severe floggings. This, be it noted, was in the early 19th cent. The outcry produced in England when these facts became known forced the gov. to intervene, with the result that 2 volunteer priests from Ireland were allowed to minister to the Rom. Catholic convicts of Australia. It was Wm Ullathorne, an Eng. Benedictine monk who had volunteered for work in Australia, who was largely responsible for the reform of abuses connected with the transportation of prisoners and who recruited from Ireland further priests for the Australian mission. As the number of Rom. Catholic clergy in Australia grew, so their demand for an organised episcopate became the more insistent, and it was

natural that, when Rome eventually appointed bishops, these should have been almost exclusively of Irish blood. The high proportion of Irish clergy and laity in the R. C. C. in Australia has been maintained to this day, and it can truly be said that the estab. of the Church in that continent was chiefly the work of the Irish.

Rom. Catholics do not form a large proportion of the white pop. of S. Africa, but, as in other Eng.-speaking overseas lands, the Irish element is very strong, being estimated at 90 per cent.

The foundations of the R. C. C. in Canada were laid, as we have seen, by the Fr. colonists in the 17th and 18th cents. It was not till the 19th cent. that the Irish began to arrive in any considerable numbers. Throughout that cent. Irish immigration was continuous and abundant, the peak years being the forties, when famine and cholera drove them from their native land. A large proportion of these immigrants took part in the opening up of the Canadian Far W., and so it came about that, while the R. C. C. in Lower Canada is mainly Fr. in its character and personnel, Catholic development in the more recently settled lands farther W. has been a mainly Irish achievement.

Something similar has been witnessed in S. America. There, as in Canada, the R. C. C. was officially introduced by European colonists with the backing of their home govs., and the conversion of the natives was part of the same process. When, therefore, Irish immigrants began to arrive in the 19th cent. they found a church already estab. and fully staffed by Latin Americans. Consequently the Irish contribution towards the building up of the R. C. C. in S. America has been the swelling of the ranks of the faithful rather than, as in N. America, the imparting of an Irish character to a Church still in process of development. Irish names abound in S. America, especially in Argentina, and in the hist. of the wars of independence, by which the colonists won their freedom, Irishmen were conspicuous on the side of the rebels. Among direct contributions of the Irish to S. American religion may be mentioned the heroic missionary labours in Paraguay of the Jesuit, Father Thomas Field (1549-1626), a native of Limerick, and the introduction of the Passionist Order into Argentina (1880) by Fathers Martin Byrne and Fidelis Stone, priests from N. America. Father Fidelis was also responsible for the introduction of this Order into Chile (1898).

As regards the part played by the Irish in the spread of their religion in the U.K., we have seen that Irish missionaries were preaching the faith in Britain in the 6th and 7th cents. In the 18th cent. the wheel of hist. had turned full circle, and we find the Irish repeating the work of their ancestors in the same region. Towards the end of the 18th cent. the Eng. Parliament had given legislative sanction to certain mitigations of the penal laws under which Rom. Catholics

had suffered since the Reformation. Full freedom did not come till the Catholic Emancipation Act of 1829, but that measure, without which Rom. Catholic progress would have been blocked, was only forced through Parliament as a result of the nation-wide agitation of the Rom. Catholics of Ireland led by Daniel O'Connell (q.v.). Moreover, the exploitation in the interests of the R. C. C. in England of the freedom thus gained would never have reached the proportions it did but for the great increase of the Rom. Catholic pop. of the U.K. through Irish immigration, due chiefly to the Irish potato famine in the middle of the cent. By the sixties the number of Irish settlers in England was well over half a million. These immigrants settled chiefly in the large industrial towns. They belonged almost entirely to the poorest class—otherwise they would have emigrated to America—but it was by means of their financial contributions that large numbers of Catholic chapels were built in the areas they inhabited. Priests from Ireland came over to serve these chapels, and thus the R. C. C. in England, Wales, and S. Scotland experienced a material and numerical expansion to which, more than to any other cause (not excepting the Oxford Movement), the R. C. C. in Great Britain owes its present position. The Irish immigration has also affected very considerably the character and mentality of Eng. Rom. Catholicism. Its demonstrative worship and apostolic fervour contrast forcibly with the sober and unobtrusive Eng. Catholicism of penal times. Moreover, its clerical personnel has become very markedly Irish in blood. By 1955 about half the Rom. Catholic bishops of England were of Irish extraction.

The Roman Catholic Church in Modern Europe. While the history of the R. C. C. since the 16th cent. has shown a steady—and often phenomenal—growth in the new countries overseas, in Europe its story during this period has been mainly one of consolidation and defence. Conservatism, rather than enterprise (as in the Middle Ages), has marked its intellectual life, while politically its policy has been to seek a *modus vivendi* with national govts., whether Catholic or non-Catholic. This has been done by means of concordats (q.v.) between the Holy See and secular govts., a denunciation of a concordat by a secular gov. being the usual preliminary to a break between the 2 parties. The Holy See also maintains official representatives of varying rank with most European govts., as well as with over 40 non-European states, while most of these states have accredited representatives at the Vatican. There are no official relations, however, between the Holy See and countries belonging to the communist bloc. The political prestige of the Holy See has been further enhanced by the Lateran Treaty (1929) with the It. gov., by which the Vatican City was recognised as a sovereign state. Moreover, its spiritual prestige has been

augmented by the canonisation of Pius X in 1954. Another political phenomenon affecting the standing of the R. C. C. in Europe in recent years has been the rise in certain European countries of professedly Catholic parties, e.g. the M.R.P. in France and the Christian Democrats in Italy. Rom. Catholics likewise form the backbone of the Christian Democrat party in Germany (Federal Republic). These various developments seem to mark the end of the period of defence for the R. C. C. in Europe and the beginning of a forward policy, though it must be admitted that the erection of Communist govts. in Poland, Czechoslovakia, and other East European countries mark a grave setback to the spread of the faith in the Old World. In the purely spiritual sphere the past 100 years of European Catholicism have been marked by a noteworthy increase in Marian devotion, as witnessed by the definition of the dogmas of the Immaculate Conception (1854) and of the Assumption (1950), and by the public honour paid to the Mother of God at such modern shrines as Lourdes and Fatima (q.v.). This has had its counterpart in the realm of speculative theology, where such questions as Mary's role as Mediatrix of Grace are under active discussion. Another spiritual movement emanating from Catholic Europe is that known as Catholic Action, whereby the laity are enlisted in the active apostolate of the Church. In general, it may be said that the R. C. C. in modern Europe shows a vitality which contrasts favourably with its more static condition in the 17th and 18th cents. From the historic and geographic centre of the Catholic faith there is to-day being radiated a spiritual force which serves to energise both the interior and the exterior life of the Church throughout the world.

See CHRISTIANITY; CHURCH HISTORY; CONCORDAT; COUNCILS, CHURCH; COUNTER-REFORMATION; LATERAN TREATY; MONASTICISM; PAPACY; UNIATS. Saints will be found under their individual names, and Popes likewise. Cathedrals and churches will be found under their place entries. *See also* H. J. D. Denzinger, *Enchiridion Symbolorum et Definitionum*, 1874; St Thomas Aquinas, *Summa Theologica*, Eng. trans. 1920 ff.; *Cambridge Summer School Series*, 1922–39; P. Hughes, *History of the Catholic Church* (3 vols.), 1934–47, and *The Reformation in England* (3 vols.), 1950–3; D. Mathew, *Catholicism in England 1535–1935*, 1936; Burns and Oates (pub.), *The Teaching of the Catholic Church*, 1947; C. Dawson, *Religion and the Rise of Western Culture*, 1950; E. Gilson, *The Spirit of Medieval Philosophy*, 1950. For Law and Organisation, *see Codex Juris Canonici*, 1917; this applies to the W. part of the Church only.

Roman Catholic Emancipation, see CATHOLIC EMANCIPATION.

Roman-Dutch Law, compound system of law, of which the basic principles are those of the Law Natural (*see JURISPRUDENCE*), made up of Ger. customs modified by the principles of Rom. law.

and developed by later Dutch customary law. The founder of the system of jurisprudence known as R.-D. L. was Grotius (q.v.), he being the first writer to systematise the confused mass of legal principles which obtained in his day, and it is upon Grotius's classic (*Introduction to the Jurisprudence of Holland*) that subsequent legislators and jurists have erected the whole modern fabric of R.-D. L. The legal systems of South Africa and Ceylon are based on R.-D. L. See J. W. Wessels, *History of the Roman-Dutch Law*, 1908; Hugo de Groot, *Introduction to Roman-Dutch Law* (Eng. trans. by R. W. Lee), 1926; A. F. S. Maasdrorp, *The Institute of Cape Law* (4th ed.), 1922-6.

Roman Empire, Holy, see HOLY ROMAN EMPIRE.

Roman History. The Latins (see LATINI) were a branch of the Indo-European peoples who came into Italy from across the Alps towards the end of the second millennium BC. The numerous hill-top settlements of these folk gradually coalesced into larger city states, the greatest of which was Rome. The dominant position of Rome was assured by its geographical situation within easy reach of the sea and the centre of the peninsula, by its command of the Tiber ford, and by its consequent control of an important salt route between the mouth of the riv. and the Apennines.

So far as written hist. goes the earliest period of Rome is shrouded in myth. It is probable that government by kings was adopted about the end of the 7th cent. BC. Again, the kingly period is obscure. We can, however, say that some of the kings were Etruscans (q.v.); that they were advised by a senate representing the noblest patrician clans; and that the less privileged orders were divided into 30 *curiae* and, for military purposes, into *centuriæ* upon a property basis. The whole people, patricians (q.v.) and plebeians (q.v.), were included in a number of tribes which eventually increased to 35 in the 3rd cent. BC. Under the Etruscan kings Rome advanced in civilisation, in commercial prosperity, and in geographical extent. It should, however, be noted that the Etruscan civilisation was essentially oriental and urban in character, but that despite its influence Rome remained essentially Lat. and agraric.

At the end of the 6th cent. BC the last king, Tarquinius Superbus, was expelled, the monarchy abolished, and an aristocratic republican constitution set up. Two annually elected magistrates called consuls (q.v.) were appointed, though in an emergency these might be superseded by a dictator (q.v.).

THE REPUBLIC: (a) c. 509-265 BC.—This period is best considered under 2 headings, the struggle between the orders, and the struggle for power in Italy. From the beginning of the republic the plebeians had grievances. The wealthier members of their order desired political and social equality with the patricians. They were incapable of holding public office and of

contracting marriage (*connubium*) with the patricians. The poorer demanded more land, amelioration of the severe laws of debt, and a measure of personal security against the power of the magistrates. The prin. weapon in the struggle for these rights was the *secessio*, whereby the plebeians in a body left the city and set up, as it were, a state within the state.

After the first secession to the Mons Sacer the plebeians secured the appointment of their own officers, tribunes (q.v.) and aediles (q.v.). The former enjoyed personal inviolability and a power of veto. The latter had charge of the temples and public places. In 471 the *Lex Publilia Voleronis* made the plebeian assembly lawful and empowered the tribunes to propose and carry measures therein. These enactments (*plebiscita*) were binding only on the plebeians. The effect of the promulgation of the code of laws known as the Twelve Tables (q.v.) (451-450) was to limit the power of the patrician magistrates. In 449 the Valerio-Horatian Laws enacted that the determinations of the plebeian assembly should be binding on the whole people, subject to ratification by the senate. Four years later the plebeians gained the right of *connubium* by the *Lex Canuleia*, and in 421 the quaestorship. This social legislation was interrupted by war; but in 367 the 'Licinian Rogations' enacted that one consul must be a plebeian, and 10 years later a plebeian, Caius Marcus Rutilius, held the office of dictator. The censorship (see CENSORS) and praetorship (see PRAETORS) were occupied by plebeians in 350 and 337 respectively and in 300 the *Lex Opuntia* opened to them the exclusive college of pontiffs (q.v.) and augurs (q.v.). Finally, in 287 the *Lex Hortensia* enlarged the provisions of the Valerio-Horatian laws by exempting the plebeian decrees from senatorial ratification. The sovereignty of the people was now established; and if the newly won political privileges were accessible only to a small clique of rich men, the less fortunate benefited by the distribution of land as the conquest of Italy proceeded and by such measures as the *Lex Poetelia de Nexis*, which abolished imprisonment for debt. We have now to consider the stages whereby Rome became mistress of the peninsula. After the abolition of the monarchy Rome found herself between the sea and a wide semicircle of hostile peoples, the Etruscans, Samnites, Aequi, and Volsci. The other cities of Latium were linked in a union known as the Lat. League, and with this league Rome now negotiated an alliance in face of the threat. The Aequi and Volsci were the first to attack. In the first half of the 5th cent. BC the Romans and Latins with the independent tribe of the Hernici conducted a successful defensive. In the second half they went over to the offensive and to final victory. In 406 the expanding Rom. influence resulted in a clash with Etruria. This campaign was concluded in 396 with the capture of Veii, and the whole of S. Etruria was annexed.

Much of the Rom. success in this area.

was due to the preoccupation of the N. Etruscans with the Gauls who were invading from the Alps. In 390 these savage tribes entered Rom. ter., defeated the Rom. Army on the banks of the Allia, sacked the city, but withdrew after a fruitless siege of the Capitol. The Romans never forgot this disaster (*dies Alliensis*), which was a severe blow to their prestige. Once more it was necessary to put down risings of neighbouring tribes, and once more the Rom. arms triumphed and extended their boundaries. The Lat. League was reorganised (358) on terms somewhat less favourable to the Latins. These attempted to regain their independence (340-338), but were crushed. The league was finally dissolved, and each member obliged to enter into treaties directly with Rome.



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A ROMAN TRIUMPH

A successful general returning to Rome after a campaign, publicly honoured by a triumph.

Rom. interests became paramount in Campania following the alliance with Neapolis (326), and 3 campaigns resulted against the Samnites. Despite the humiliation of the Caudine Forks (q.v.) in 321, the Romans inflicted a crushing defeat upon their enemies at Sentinum (295), and 5 years later the Samnite coalition was finally destroyed.

Meanwhile the Gk settlements of the SE. viewed with increasing apprehension the advance of Rom. arms. The *casus belli* befell in 281, when the Tarentines, not

without provocation, attacked a squadron of Rom. warships which had entered their waters, and insulted the Rom. ambas. who demanded satisfaction. Tarentum summoned to its aid King Pyrrhus (q.v.) of Epirus. He landed in Italy (280), but after 2 'Pyrrhic' victories at Heraclea and Asculum was decisively beaten at Beneventum (276).

Rome had now conquered the whole of Italy except Cisalpine Gaul. Her triumph had been achieved not only by force of arms, but also by her policy of colonisation and the building of roads. Much of the peninsula now enjoyed Rom. citizenship, and those who did not were bound to Rome by alliances of various grades. While direct taxation fell exclusively upon citizens, all, citizens and allies, were bound to do military service. Most important, a common culture superseded local languages, cults, and customs.

(b) 264-146 B.C. *The Punic Wars*. This period of 120 years marks the second great crisis of the W., for the Carthaginian civilisation which now confronted Rome was no less essentially Asiatic than was the Persian which confronted Greece in the first crisis and those which have since periodically imperilled W. culture. There had long been rivalry between the 2 great commercial centres of S. Greece and Carthage (q.v.), and the representation of the Gk cities had now passed to Rome. The occasion of the clash was the decision of Rome (264) to aid the Mamertines against Hiero II (q.v.) of Syracuse. Carthaginian influence in Sicily was strong; consequently the decision was regarded as an act of war. In this, the first Punic war, Rome, despite the loss of 3 fleets, won some remarkable successes by sea, especially the battle of Mylae (260). When the war ended in 242 Carthage agreed to pay an indemnity, and evacuated Sicily, whereby Rome acquired her first overseas possession.

It was clear to both sides that the contest would sooner or later be renewed. The 2 powers could not share the Mediterranean world. The years between the first and second Punic wars saw the Rom. occupation of Sardinia and Corsica; the Illyrian wars (229-219), which resulted in the suppression of piracy on the Dalmatian coast and Rom. alliances with Apollonia, Epidamnus, and the island of Corcyra (Corfu); and preparation for the impending struggle with Carthage. At Carthage the influence of the brilliant family of the Barcas was hampered by a jealous aristocracy, and Hamilcar Barca (q.v.) estab. a military state in Spain where Carthage already had commercial dependencies. He and his son-in-law, Hasdrubal (q.v.), consolidated the whole of E. Spain; and when Hasdrubal was assassinated (221) his place was taken by Hamilcar's son, Hannibal (q.v.), who immediately began to extend his authority northwards. In 218 Hannibal took Saguntum, a city in alliance with Rome. This was the signal for war, and Hannibal crossed the Alps into Italy. Owing to his military genius and the lack

of generalship among the Romans the Carthaginian Army delivered a series of crushing blows, culminating in the disaster of Cannae (216). The Romans, however, with amazing tenacity and the skill of new commanders, notably Quintus Fabius Maximus (see under FABIA GENs) and the younger Scipio (q.v.), gradually resumed the offensive. Hannibal meanwhile lacked the support of his gov.; Capua fell in 212, and in 207 the Carthaginians under Hannibal's brother, Hasdrubal, were completely routed on the Metaurus. Hannibal was recalled to Africa in 203, and in the following year suffered a total defeat at the hands of the younger Scipio (q.v.) at Zama. Carthage signed a treaty of peace in 201 which gave Rome Spain and the Mediterranean ls., left Carthage with only 20 warships and the obligation to pay a war tax for 50 years, and virtually gave the Romans a decisive voice in the affairs of Carthage, both at home and overseas.

The next 50 years proved that these humiliating conditions had not destroyed the commercial genius of Carthage, and Rome, led by M. Porcius Cato (q.v.), determined that Carthage must be destroyed ('Carthaginem esse delendam'). The occasion was given in 153. The Numidian king Massinissa (q.v.), an ally of Rome, appropriated the rich district of Emporiae, part of the Carthaginian ter. The Carthaginian Gov. attempted to regain it by force of arms contrary to the treaty of 201, and, despite their efforts to avoid war with Rome, a Rom. army landed in Africa (149) under the command of Scipio Aemilianus (q.v.), forced Carthage to surrender, and razed the city. The dist. of Carthage became the Rom. prov. of Africa (146) with Utica as its cap. Two important results followed from the Punic wars. Rome was now mistress of the whole W. Mediterranean area and W. culture was saved. It was the Rom. destiny to spread that culture through the medium of universal dominion. Economically, Rome henceforward relied upon imports of corn, and the native agriculture began to decline. The wealth of Rome was vastly increased, and this imperial aggrandisement with its accompanying seeds of degeneration was hastened from another quarter.

(c) 200-133: *Rome and the East.* The Romans had already come under the influence of Gk culture in the cities of S. Italy. Since the death of Alexander the Great (q.v.) the Gk mainland had fallen into a state of virtual anarchy. During the second Punic war, Philip V (q.v.) of Macedon had allied himself with Hannibal, and Rome, after Zama, had punished his delinquency at the battle of Cynoscephalae (197). Philip, however, was granted peace on generous terms, and the freedom of the Gk cities was reaffirmed (194).

Antiochus III (q.v.) of Syria was another of those who had leagued himself with Hannibal; the Romans now turned upon him and defeated him at Thermopylae (191) and Mt. Sipylus (190). Antio-

chus forfeited his possessions in Europe and Asia Minor, and these were divided by Rome among friendly monarchs until such time as she chose to absorb them.

War against Macedon was renewed in 171. It ended with the Rom. victory at Pydna (168). The Macedonian king Perseus was captured with all his treasure and a rep. was estab. In 147 the Achaean League (q.v.) attempted to regain Gk independence. The league was finally defeated in 146 when Lucius Mummius sacked Corinth and transported its immense wealth and priceless works of art to Rome. Two more Rom. provs. were set up, Macedonia and Achaia, and a Rom. protectorate was recognised in Asia.

(d) 146-49: *The Revolution.* In little more than a hundred years Rome had advanced from the status of a powerful city state to that of a world power, and the machinery of government which had hitherto served her had become totally inadequate. Moreover, the increase of wealth, with its accompanying moral decay and the decline of agriculture, had resulted in near chaos. Those who sought to remedy this state of affairs believed that the foundation of recovery was agrarian reform, and a lead was given by Tiberius Gracchus (q.v.). He was elected tribune in 133, but the measures which he proposed evoked such violent opposition from the senate and capitalists that he was assassinated. Nor did his brother Gaius Gracchus (q.v.) meet with much more success, suffering a like fate in 121.

The struggle for power now shifted to the military sphere. Gaius Marius (q.v.) had reformed the Army, successfully concluded (106) a war against the Numidian king Jugurtha (q.v.), repelled a barbarian irruption, and, together with his colleague Sulla (q.v.), suppressed the rebellion of the Italians known as the Social war. The mutual jealousy of Marius and Sulla ripened into civil war. In 83 Sulla, having defeated Mithridates the Great (q.v.) in Asia, marched on Rome and by the victory of the Colline Gate made himself master of Italy. He posed as the champion of senatorial gov., was appointed dictator for an unlimited period, and after a reign of terror known as the Sullan proscriptions, set up a new constitution which aimed at making the senate supreme. Sulla retired into private life, and immediately the democratic party sprang to life. After an abortive attempt by Marcus Aemilius Lepidus (q.v.) to restore the constitution, a civil war in Spain (see SERTORIUS), and the slave revolt of Spartacus (q.v.), order was for a time restored. The prin. agent of the senate in suppressing these revolts was Gnaeus Pompeius (q.v.) (Pompey the Great). He now (70), with his colleague in the consubship, Marcus Licinius Crassus (q.v.), leagued himself with the democratic party, restored the pre-Sullan constitution, and reorganised the administration of the provincial taxes.

Pompey was next called upon to settle affairs in the E. By the *Lex Gabinia* he

was given a 3 years' command with extraordinary powers against the Mediterranean pirates, and fulfilled his mission within 3 months. He was next entrusted by the *Lex Manilia* with the continuance of the second Mithridatic war, which, with varying fortune, had been in progress since 74. Having repelled the immediate danger to the Rom. provinces in Asia Minor, Pompey ordered certain pressing E. affairs, notably the boundary dispute between Parthia and Armenia. Syria was made a prov., as were Asia,

tained order, and extended the privileges of the provincials. It was already clear to him that if gov. was to be successfully carried on it must be in the hands of one man, and that his own were the most capable to guide the State. He obtained from the senate an extraordinary military command for 5 years with power to raise levies and appoint his subordinates.

Caesar at once left for Gaul, from where, in the intervals of some brilliant campaigns, he made 2 expeditions to Britain (q.v.). One result of these successes was



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THE DEATH OF CAESAR

Mark Antony's funeral oration, as pictured by J. D. Court. Two of the conspirators, Calpurnius Cassius and Marcus Brutus, are seen on the left of the painting.

Bithynia, Pontus, Cilicia, and Crete. During the 5 years (67-62) of Pompey's sojourn in the E. Rome was again in confusion. The conspiracy of Lucius Sergius Catilina (see CATILINE) had been broken by the vigilance of Marcus Tullius Cicero (q.v.) as consul; but the senate refused to ratify Pompey's E. settlement, and it quarrelled also with the Equites (q.v.). At this juncture there returned from military triumphs in Further Spain, Gaius Julius Caesar (q.v.). With him and Crassus, Pompey formed the first triumvirate, and in 59 Caesar was consul. In this capacity he forced the ratification which the senate had withheld and carried other reforms calculated to restrict the senatorial power. If these measures were not entirely popular, Caesar yet laid the foundations of a strong central gov., main-

to rouse the apprehension of Pompey, who now tried to increase his own power. But he lacked support, and so in 56 the triumvirate was renewed. In 56 Pompey and Crassus were consuls, but after the defeat and death of Crassus at the hands of the Parthians at Carrhae (53) Pompey received dictatorial powers as *consul sine collega*, and the breach between him and Caesar rapidly widened. The climax was reached in 49, when Pompey successfully attempted to have Caesar declared a public enemy. The die was cast, and Caesar, who had been watching events from Ravenna, crossed the Rubicon with 1 legion, and civil war began.

(e) 49-31: *End of the Republic*. At his approach the senate fled from Rome, which Caesar occupied. There followed a series of astonishing campaigns whereby

Caesar made himself master of the whole Rom. world. Pompey's lieutenants, Lucius Afranius and Marcus Petreius, were routed at Ilerda in Spain, and Caesar crossed into Epirus (48), where he defeated Pompey at Pharsalus. Pompey fled to Egypt, where he was assassinated; Caesar followed him there and estab. Cleopatra and her brother Ptolemy XIII as joint rulers. He then hurried to Asia Minor, where Pharnaces II (q.v.) of Bosphorus had invaded Rom. ter., and defeated him at Zela (47), the occasion of his celebrated message to the senate, 'Veni, Vidi, Vici.' The following year he won Numidia at the battle of Thapsus against the Pompeian forces under Scipio, and in 45 gained his crowning victory in Spain at Munda.

In the intervals of these campaigns Caesar began to settle the affairs of Rome. He restored order in Italy, reorganised the finances at home and in the provs., and reformed the calendar. In all but name he was monarch; nor was he at pains to hide the fact, understanding that it was the only method by which the empire could be satisfactorily governed. The jealousy thus aroused in disappointed ambition issued in Caesar's murder (15 Mar. 44), and once again Rome was on the brink of civil war.

The leading conspirators in the murder, Marcus Junius Brutus (q.v.) and Cassius Longinus (see CASSIUS), in the face of popular hostility fled to the E. Marcus Antonius (q.v.), once Caesar's able though dissolute lieutenant, went to Cisalpine Gaul. Caesar's great-nephew and heir, Gaius Julius Caesar Octavianus (the future Augustus), posed as champion of the senate, won the support of Cicero, and rallied an army of Caesar's veterans. Octavianus was sent to the relief of Mutina besieged by Antony; but in the following year he, Antony, and Marcus Aemilius Lepidus (q.v.) formed the second triumvirate. Savage proscriptions now began, and among the thousands who perished therein was Cicero (43). The triumvirs next met and defeated the republican forces under Brutus and Cassius at Philippi (42). The situation hardened into a contest between Antony in the E. and Octavianus in the W. It was resolved in 31 at Actium, one of the decisive battles of the world, and Octavianus emerged as sole leader of the Rom. world.

THE EMPIRE. (a) *Augustus* (q.v.).—*Marcus Aurelius*. It was the intention of Octavian, while exercising supreme power, to preserve, on the one hand, a show of republican institutions and to restore, on the other, the old Rom. manners and religion which formerly inspired her arms. As giver of peace he had the support of all classes, and future ages looked back to his reign as to a Golden Age. Styling himself *princeps senatus*, he restored, at least in name, the authority of the senate, the magistrates, and the popular assemblies. The conferring of the title Augustus, however, made his pre-eminence clear to all; while the *imperium proconsulare* and *tribunitia*

potestas, which he received for life, made him absolute master of the State, civil and military, both at home and abroad. Order was restored at home, the provs. reorganised, and the frontiers extended to the Danube. If Augustus died (AD 14) an unhappy man through family misfortunes, he had given Rome 50 years of peace and good government, and had estab. an empire whose supremacy is still felt in European law, art, and literature. There were, however, from the beginning certain defects in the Rom. Empire which were eventually to destroy it. Perhaps the most fundamental defect, and that which characterised all the empires of antiquity and many to-day, was a total ignorance of the nature of man and his destiny and a consequent blindness to his rights and duties. Hence the moral degradation of the empire; hence the savage autocracy of the less-enlightened rulers as Caligula (37–41), Nero (54–68), and Domitian (81–96). More immediately evident were the economic weaknesses, chief of which was the impossibility to provide by reasonable taxation for the defence of the enormous frontier line against the barbarian hordes who were already stirring at the gates. Again, the power of the emperors depended to an increasing degree upon the armies, especially upon the praetorian guard which, from the time of Caligula, practically made and unmade emperors at its will. Among the more important events of this period we may mention the rise of Christianity; the beginnings of the Rom. civil service in the reign of Claudius I (41–54) under the freedmen Pallas and Narcissus; the Jewish wars of Vespasian and Titus, which ended with the destruction of Jerusalem (70) and the beginnings of the *diaspora*; the brilliant 'Age of the Antonines' when the empire reached its zenith; and the ever-increasing advance of the imperial dignity from principate towards autocracy. (See also ANTONINUS PIUS; AUGUSTUS; CALIGULA; CLAUDIUS; DOMITIAN; GALBA; HADRIAN; MARCUS AURELIUS; NERO; NERVA; OTHO; TIBERIUS; TITUS; TRAJAN; VESPASIAN; VITELLIUS.)

(b) *Marcus Aurelius-Dioctletian*. The Rom. Empire reached its greatest extent under Trajan. In the reign of Marcus Aurelius (161–80) the weakness of the frontiers first became apparent. The legions were largely composed of barbarian recruits, and they, lacking anything in the nature of patriotism, were as great a danger as their kinmen without. A succession of soldier-emperors followed; they were placed on the throne by the sword, and by the sword most of them perished. Two of them, however, Claudius II, an Illyrian, and Aurelian, a Pannonian, managed to stem the tide of invasion and for a time to restore the lustre of the fading empire.

(c) *Dioctletian-Romulus Augustulus*. Dioctletian succeeded in 284. He was an Illyrian by birth. He finally abandoned the last pretence of a diarchy of emperor and senate, even assuming the trappings

of oriental despotism and the style of 'Dominus.' His reforms, however, both economic and political, were so far-reaching that a period of peace and prosperity ensued. In order more easily to repel the barbarians he associated himself, with the title of Augustus, Maximianus. He retained supreme command, but took as his special prov. Asia and Egypt, while Maximian took Italy and Africa. Two subordinate sovereigns were also adopted with the title of Caesar, Galerius in Thrace and Illyria, and Constantius Chlorus in Gaul and Spain.

Immediately on Diocletian's abdication (305) fierce quarrels broke out, and civil war raged for 10 years until Constantine the Great emerged as sole emperor. Under him there occurred 2 events of vital importance in the hist. of the world. In 325 he summoned at Nicaea the first of a long series of general councils of the Church, the effect of whose decrees in the political as well as the theological sphere has endured until our own time. In 334 Constantine proclaimed Christianity as the official religion of the Rom. state. The other cardinal measure was the div. of the empire into E. and W. by the foundation of a new capital at Byzantium (Constantinople), with a new senate and a new nobility. This E. empire was Gk in culture and developed into the Byzantine Empire which endured through many vicissitudes but unvarying splendour until 1453. Once again, on the death of Constantine (337) the rival Caesars fought for power while the barbarians swept across the frontiers of the W.

In 364 Valens was appointed W. emperor by his brother, Valentinian I, of the Byzantine. For a time he succeeded in holding the Goths at bay, until his defeat in 378. Byzantium itself was now threatened; but the emperor Theodosius, by astute diplomacy, managed to save his own dominions and the throne of his W. colleague Gratian. From the death of Theodosius (395) the remaining hist. of the W. empire is chaos. Wave on wave followed of Goths, Huns, and Vandals. Honorius (384-423), with the aid of his general Stilicho (a Vandal), defeated the Goths; but after Stilicho's death Alaric, the Visigothic king, having ravaged Macedonia and Illyria, captured and sacked the city of Rome. Gaul and Italy were overrun by the Huns, while the Vandals conquered N. Africa. In 451 the Vandal Genseric again sacked Rome; and finally in 476 the little emperor Romulus Augustulus resigned his throne to Odoacer (q.v.), who signified to Zeno, the E. emperor, that there was no longer need for a div. of the empire. Zeno should rule a united empire whilst Odoacer governed as patrician of Italy.

As regards the sources of Rom. hist. from the estab. of Rom. supremacy in the Mediterranean until the fall of the republic (133-29 BC) only 35 of the 142 books of Livy's *Ab urbe condita libri* (trans. by W. M. Roberts, 1912) remain, though epitomes of all but books 126 and 127 have survived. The first 5 of Polybius's

40 books alone survive. Of the *Bibliotheca historica* of Diodorus 15 out of 40 books remain. Connected narratives are to be found in the 11 extant books of Appian's *Civil Wars*, Sallust's *Catilina* or *Bellum Catilinarium* and *Jugurtha* or *Bellum Jugurthinum* (both trans. by A. W. Pollard, 1882), and the *Commentarii* and *Gallie Wars* (both trans. by J. Warrington, Everyman's Library, 1953) of Caesar. Neither of these works of Caesar completed the hist. of the Gallic and civil wars; the hist. of the former was completed in an eighth book usually ascribed to Hirtius, a partisan of Caesar, and the hist. of the Alexandrine, African, and Sp. wars was written in 3 separate books which are ascribed to various Rom. officers. From the year 68 BC onwards the hist. of Dio Cassius is completely preserved, books 36-54 embracing the hist. from the wars of Lucullus and Pompey against Mithridates to the death of Agrippa (10 BC). His description of this age is well supplemented by the writings of Cicero. Reference should also be made to the biographies of Plutarch (trans. by B. Perrin, Loeb ed., 1914-26). It is only for the first century of the imperial age (29 BC-AD 285) that the sources are abundant enough to enable us to gain a relatively clear idea of it. Of the 2 great works of Tacitus (the *Annals*, trans. by G. G. Ramsay, 1904-8; also in the Loeb ed., describing the period from Augustus to Nero, and the *Histories*, trans. by G. G. Ramsay, 1915, which embrace events from 69 until the death of Domitian) important portions are lost; but despite his prejudice he is the most trustworthy witness of that great age. Of Rom. historians writing in Greek, an extant hist. of the Rom. Empire in 8 books from the death of Marcus Aurelius to the year 238, by Herodianus (trans. by J. H. Hart, 1749; also in Loeb ed.), is valuable despite its defects. For the last period of the hist. of the W. Empire from its reorganisation by Diocletian and Constantine to the fall of the W. throne (285-476) the sources are more abundant than for the period 29 BC-AD 285, but are of very unequal merit. Of connected narratives only 2 are of real importance: the 18 extant books, in Latin, *Rerum Gestarum Libri XXXI*, on the hist. of the empire from 353 to the death of Valens (378), by Ammianus Marcellinus (trans. by C. D. Yonge, 1862), last of the great Rom. historians, and the hist. in 6 books in Greek by Zosimus, a Gk pagan historian of the time of Theodosius II, who comments severely on the faults and crimes of the Christian emperors, whence his credibility has been assailed by sev. Christian writers. Most valuable, not only for legal and constitutional but even for contemporary hist., is presented by the great collections of laws which were made under the emperors Theodosius II and Justinian. For our knowledge of the reorganisation of the empire by Diocletian and Constantine, we owe much to the *Notitia dignitatum*, a contemporary official document of great historical interest.

See E. Gibbon, *The Decline and Fall of the Roman Empire*, 1776-82; T. Arnold, *History of Rome*, 1838-43; C. Merivale, *A History of the Romans under the Empire*, 1850-64 (also in Everyman's Library); T. Mommsen, *The History of Rome* (trans. by W. P. Dickson), 1854 (also in Everyman's Library); J. B. Bury, *History of the Later Roman Empire*, AD 395-800, 1889; H. F. Pelham, *Outlines of Roman History*, 1905; T. R. Glover, *The Conflict of Religions in the Early Roman Empire*, 1909; C. R. L. Fletcher, *The Making of Western Europe* (vol. i), 1912; H. L. Havell, *Republican Rome: Her Conquests, Manners, and Institutions to the Death of Caesar*, 1913; J. B. Bury, *History of the Later Roman Empire from the Death of Theodosius I to the Death of Justinian*, AD 395-565, 1923; T. Rice Holmes, *The Architect of the Roman Empire 27 BC to AD 14*, 1931; J. Wells and R. H. Barrow, *A Short History of the Roman Empire*, 1931; *Cambridge Ancient History* (vol. ix, *The Roman Empire*, 133-44 BC, ed. by S. A. Cook and others), 1932; C. E. Robinson, *A History of the Roman Republic*, 1932; W. Deering, *The Man on the White Horse*, 1934; J. C. Stobart, *The Grandeur that was Rome*, 1934; M. D. Parker, *A History of the Roman World from AD 138 to 337*, 1935; J. M. Cobban, *Senate and Provinces*, 78-49 BC, 1935; H. W. Household, *Rome: Republic and Empire* (2 vols.), 1936-8; J. Westbury-Jones, *Roman and Christian Imperialism*, 1939; A. Petrie, *An Introduction to Roman History, Literature and Antiquities*, 1939; E. T. Salmon, *A History of the Roman World*, 1944; M. Cary, *The Geographical Background of Greek and Roman History*, 1949; M. P. Charlesworth, *Augustus and the Roman Empire*, 1950.

Roman Law, law founded on the Twelve Tables (q.v.). It is on this basis that the body of the *corpus juris civilis* (q.v.) or later private law of Rome was developed. The Twelve Tables represent the private law of ancient Rome in its earliest period. Custom was its foundation; its elements were known only by tradition, but, later, jurists knew it as the *jus civile* or law peculiar to the Roman State. The hist. of R. L. is that of the changes introduced into the *jus civile* and of the method adopted in its evolution. It was only in the later days of the empire that the *jus civile* began to be swept away; but for the student it is essential to recognise the elementary doctrines of the old *jus civile*. The chief of these peculiar principles are those which determine the position of a *paterfamilias* (see AGNATES), or father of a family; the succession to his estate; and the contracts and actions relating to the chief possessions of an agric. proprietor. The most important addition to the system of R. L. was the conception of the *lex naturae*—a conception borrowed from the Stoics. By *lex naturae* was meant the law by which the actions of man were to be guided as well as the law directing the universe, and out of it grew the *jus gentium* (q.v.), which, with the *jus naturae*, were the 2 chief agents in modifying and

extending the rigid and narrow system of the *jus civile*. In its final state R. L. is to be found in Justinian's (q.v.) *Digest*, *Code*, *Institutes*, and *Novellae*. See also CIVIL LAW. See T. C. Sandars, *Institutes of Justinian*, 1859; H. S. Maine, *Ancient Law*, 1861; R. W. Lee, *Elements of Roman Law* (4th ed.), 1956.

Roman Literature, see LATIN LANGUAGE AND LITERATURE.

Roman Numerals, see NUMERALS.

Roman Remains in Britain. It has often been pointed out that Britain was a prov. of the Rom. Empire for 3½ cents. Of the occupation there are very extensive remains not only of the dominating military system, but also of the towns and villages, shrines and tombs, and the coins, trinkets, pots, tools, and weapons of the Romans and the Romanised Britons. For the portable items museum study is necessary, and collections vary from the extensive ones of the Brit. Museum; Ashmolean Museum, Oxford; Tullie House, Carlisle; Colchester; Reading; Verulamium; and National Museum of Wales, Cardiff, down to the half-dozen pots and coins of a local library. In recent years there has been much organised research and exploration of Rom. Britain; the excavations on Hadrian's Wall (q.v.), of the towns of St. Albans, Colchester, and Leicester, of the Saxon shore fort at Richborough, and the investigation of war-damaged areas in towns of Rom. date, Dover, Canterbury, and Exeter, have yielded information of special importance.

The occupation was based on the road system, and the courses of the chief roads and of many minor roads are well known; many sectors are still visible, and aerial photography has assisted in discovery. In general, they did not follow the line of earlier tracks, and they were sited to take full advantage of natural topography. The *Fosse Way* runs from Lincoln through Leicester to Exeter by Cirencester and Bath. *Walling Street*, starting at Richborough, connects Canterbury, London, St. Albans, Wroxeter, and Chester. London is linked to the north by *Ermine Street*. From Chichester, *Stane Street* ran to London. The *Icknield Way*, perhaps a prehistoric ridge-way in origin, traversed the Berkshire downs and the Chilterns. Sev. stretches of Rom. roads are preserved as ancient monuments.

There are extensive remains of Rom. forts and military works still in existence, the chief of which is Hadrian's wall (q.v.). At Chester, York, and Caerleon-on-Usk may be seen examples of legionary forts, while at Richborough, Reculver, Lymington, Pevensey, Portchester, Burgh Castle, Suffolk, and Bradwell, Essex, are forts of the Saxon shore designed for protection against raids of the Saxon pirates. The Antonine wall has forts such as Bar Hill and Balmuildy which have been scientifically excavated. At Dover is a Rom. lighthouse which assisted cross-Channel navigation.

The walls of London, the largest town in Rom. Britain, are still visible in part, and

over many years careful observation has resulted in the elucidation of the hist. and structure of the Rom. tn. Excavation in the bomb-damaged areas has revealed the plan of a hitherto unknown fort in the Cripplegate area, and a temple to Mithras and other gods in Walbrook. At Wroxeter, Silchester, Colchester, and St Albans extensive excavation has taken place; in walls remain, but the Jewry wall at Leicester, part of the forum, and the 5 gateways at Lincoln and Colchester are among the best out-of-door relics of

remains of Rom. Britain are the villas, of which more than 500 examples have been recorded. They are found particularly in the Medway valley, in W. Sussex, Hampshire and the Isle of Wight, in Somerset, on the Cotswold Hills, and in S. Wales. The villas were country estates, self-contained, and very often self-supporting in agriculture and industry such as cloth-milling. The house of the proprietor was often furnished with mosaic pavements, painted plasterwalls, baths, and glazed windows, and was centrally heated. A



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AERIAL VIEW OF THE ROMAN THEATRE AT VERULAMIUM, ST ALBANS

Rom. Britain. At Verulamium (St Albans) is an open-air theatre, the only complete one of its kind in Britain. It was probably used as a cockpit and not for the presentation of drama, and is now carefully turfed and preserved after its excavation. There is an amphitheatre at Dorchester, Dorset, exceptionally well preserved, and the walls of a theatre have been located at Canterbury. The tn of Bath (*Aquae Sulis*) was a small but luxurious watering-place, the prosperity of which depended on its medicinal hot springs. The Great Bath, the central feature of the bathing system, may still be seen, and there is good evidence of a magnificent temple with a sculptural pediment which was probably dedicated to *Sui Minerva*, goddess of the springs.

The most popular of the architectural

remains of fine villa at Chedworth, Glos., was bought by public subscription after excavation (now National Trust). Other noteworthy villas are those at Bignor (q.v.) and Woodchester. At Lullingstone, Kent, a villa under long-term excavation has yielded a mosaic floor on which was a couplet based on an incident in *Aeneid*, Book 1, 2 remarkable portrait busts (loaned to the Brit. Museum), and painted emblems of Christian origin.

Many other remains have been filled in after excavation. Such are the small rectangular temples of S. and E. Britain which are closely similar to buildings found in Germany and Gaul, and which were for the worship of Romano-Celtic gods; the lines of one at Farley Heath, Surrey, have been marked out on the ground in concrete. A small basilican

building at Silchester, now covered in, appeared to be a Christian church. Romano-Brit. cemeteries and tombs are often revealed in farming and by industrial operations; as with pottery-kilns, the structure is usually destroyed and the contents removed to a museum. A few conical Rom. burial mounds, e.g. the Bartlow Hills, Essex, and the Six Hills, Stevenage, Herts, are still prominent features of the landscape. One such mound at Holborough, Kent, excavated in 1953, yielded a rare folding-stool of iron. See ARCHAEOLOGY; COLCHESTER; LONDON; SILCHESTER; YORK; VERULAMUM. See the ann. summaries in the *Journal of Roman Studies* for current work in R. B. See R. G. Collingwood, *Roman Britain*, 1932; R. G. Collingwood and J. N. L. Myres, *Roman Britain and the English Settlements*, 1937 ed.; I. Richmond, *Roman Britain*, 1955; *Antiquities of Roman Britain* (Brit. Museum), 1951; I. D. Margary, *Roman Roads in Britain*, 2 vols., 1955 and 1957; and the Ordnance Survey Period Map of Roman Britain. A useful guide is J. Hawkes, *Prehistoric and Roman Monuments in England and Wales*, 1951.

Roman Roads, see ROADS; ROMAN REMAINS IN BRITAIN.

Roman Type, in printing, the upright character usually used, as opposed to the sloping characters or italics. It is derived from the Carolingian script, and was developed by Alcuin of York at Tours, 796-804. R. T. began in 1465 to take the place of black letter for book printing. The term rom. in reference to numbers denotes capitals or small letters (IV, iv) as opposed to the arabic (4).

Romance, originally designated a tale written in *roman*, or 11th- or 12th-cent. Fr., instead of in Latin. Its exact nature is not easily defined. It has qualities of fantasy and mystery, while those of epic are seriousness and solidity. But just as all epic is not serious, so all R. is not fantastic, and the romantic fiction of the chivalric period shades into epic, on the one hand, and into the purely fantastic, on the other. The origin of R. is to be found in the traditional tales and literature of the Celts of Wales and Brittany, whose characters it metamorphosed into medieval Frenchmen, but whose peculiar beauty it did not capture. R. had also a direct forerunner in France itself. This was the *chanson de geste* (q.v.), of which a fine example is the *Matière de France*, or saga of Charlemagne, which was nearer to the epic in its tone of lofty heroism and its spirit of seriousness. Yet it was more romantic than R. itself, in that it possessed more of the fantastic, and that its spirit of wonder is much more genuine. The *dramatis personae* of both were similar, the geographical scene of both was alike, and the fundamental plots were the same. Only the spirit is different. The romantic school had discovered the uses of a love-interest in fiction. This is used to supreme advantage. In the R.s the relation of the sexes is idealised. This art of love

may be traced to Ovid and the later Lat. poets. Imbibed by a literary *coler*ie who communicated it to society at large by the means of lyric verse, assisted by poetic contests and 'courts of love,' this spirit soon found its way into the R. or fiction of the day. By the 12th cent. this *art d'amour* had taken vigorous hold of the Gallic mind. It is by the 'discovery' of love that R. constituted something quite different from its predecessors in fiction. It attained also a sophistication not seen in W. European literature since the Rom. Empire. But the Fr. romancers were in reality a highly unromantic body of writers, their love of the strange being merely an interest in novelty. As a result, the R., especially in France, has a cloying artificiality and frequently fails to convince.

The matter of the R. was to a large extent Arthurian. There are sev. theories as to how the myth of Arthur (q.v.) grew into prominence, but in the 12th cent. his story began to awaken general interest, which soon developed into a passionate admiration. For some time the tale was hawked about the country by jongleurs and minstrels, until at length it was seized upon by Geoffrey of Monmouth, who placed upon it the stamp of chivalric R. From England and France the tale penetrated to Germany and Italy, and for at least a cent. and a half remained the staple fictional matter of Europe, though the stories were much elaborated and distorted from the original. Geoffrey was followed by Wace, Marie de France (1150-65), Héroul (c. 1150), Thomas (c. 1130), Chretien de Troyes (d. 1182), and Guyot. Later the Grail legend became annexed to the Arthurian pure and simple, and the whole was welded into matchless symmetry by Sir Thomas Malory in the *Morte d'Arthur*. See also under NOVELS; ARTHUR; CHANSONS DE GESTES; TROUBADOUR. See G. Saintsbury, *The Flourishing of Romance*, 1897; W. P. Ker, *Epic and Romance*, 1897; L. Spence, *Dictionary of Medieval Romances and Romance Writers*, 1913; A. B. Taylor, *An Introduction to Medieval Romance*, 1930.

Romance Languages, a main branch of the Indo-European languages (see LINGUISTIC FAMILIES), originated, or rather became standardised, between the 9th and 12th cents. from vulgar Latin, which was spoken in the Rom. Empire during the last cents. of its existence.

The variety between the main R. L.—Italian, French, Provençal, Spanish, Portuguese, etc.—is due to the variation of the native non-Rom. languages, and the differences in the vulgar Latin as it was spoken in Italy, Spain, Gaul, etc. The classification of the R. L. is not yet agreed; the difficulty has already been emphasised by H. Schuchardt (*Über die Klassifikation der romanischen Mundarten*). According to F. C. Meier (1794-1878), the founder of this field of studies (1836), there are 6 R. L.: Italian, Walachian (= Rumanian), Portuguese, Spanish, Provençal (including Catalan), and French.

His theory was based on the existence of literatures. The Italian G. I. Ascoli added (1873) a group of dialects, termed *Ladin*, i.e. the *Romanisch* (q.v.) dialects of Switzerland, the R. dialects of S. Tyrol, and Friulan. The German W. Meyer-Lübke distinguishes the following 9 members of the R. L., from E. to W.: (1) Rumanian, (2) Dalmatian, (3) Rhaeto-Romanic, (4) Italian, (5) Sardinian, (6) Provençal (including Catalan), (7) French, (8) Spanish, and (9) Portuguese. His criteria are not accepted by It. linguists, according to whom Dalmatian, Rhaeto-Romanic, and Sardinian cannot be considered as independent languages, but as dialects allied or co-ordinated with, if not subordinated to, Italian, exactly as Galician should be regarded as connected with Portuguese, and Catalan as allied with Provençal. They therefore distinguish the R. L. into 7 main groups (having added a group termed *Franco-Provençal*). Other scholars choose a compromise (including Dalmatian and Sardinian in the It. group, but considering the Rhaeto-Romanic dialects as independent). This extremely important branch of languages competes with the Germanic branch (see *INDO-EUROPEAN LANGUAGES*) for first place in number of speakers and cultural and historical importance.

French is nowadays spoken by about 60,000,000 people in France, Belgium, Switzerland, and SE. Canada. It is or was the official language of the vast, or formerly so, Fr. colonies in Africa, SE. Asia, Oceania, and Central America (about 80,000,000 speakers); it is the international diplomatic language, and it is widely known all over the world. Italian is spoken by about 60,000,000 people in Italy, France, Switzerland, in N. and E. Africa, and by numerous Italians in N. and S. America (over 10,000,000). It is the language of music and art. Spanish is spoken by over 25,000,000 people in Spain, 20,000,000 in Mexico, about 15,000,000 in Central America, about 45,000,000 in S. America and by about 1,000,000 in the Sp. colonies of Africa; it is also widely known in the former Sp. possessions and in many other countries. Portuguese is spoken in Portugal (8,000,000), and in the Portuguese colonies of Africa, Asia, and Oceania (about 11,000,000), as well as in Brazil (about 45,000,000), and the allied Galago is spoken by 3,000,000 in NW. Spain. Rumanian is spoken by about 20,000,000 people in Rumania and the contiguous dists. The Rhaeto-Romanic dialects are spoken by about 50,000 people in Switzerland (the 500,000 Friulan-speakers and the approximately 300,000 speakers of the Lat. dialects are included in the number of the Italian-speakers; so are also the Sardinians, about 1,000,000). There are about 500,000 Dalmatian-speakers. The speakers of Provençal (q.v.) are included in the number of speakers of French, and the speakers of

See W. Meyer-Lübke, *Grammatik der romanischen Sprachen*, 1890-1901; *Romanisches Etymologisches Wörterbuch* (3rd ed.), 1930 ff.; and *Einführung in das Studium der romanischen Sprachwissenschaft* (3rd ed.), 1920; G. Gröber, *Grundriss der romanischen Philologie*, I (2nd ed.), 1904-6, II, 1897-1902; P. Sanj-Lopez, *Le origini neolatine*, 1920; A. Zauner, *Romanische Sprachwissenschaft* (4th ed.), 1921; G. Bertoni, *Programmi di filologia romanza*, 1922; E. Bourciez, *Éléments de linguistique romane* (2nd ed.), 1923; A. Thomas, *Mélanges de philologie et d'histoire offerts à Monsieur A. T.*, 1927.

Romanes, George John (1848-94), biologist and psychologist, b. Kingston, Canada. At Cambridge he became a friend of Charles Darwin, and extended Darwin's theories of evolution into the field of psychology. He became a member of the Royal Society in 1879. He founded the R. Lecture at Oxford in 1891, whereby an ann. lecture on a literary or scientific topic should be given by some eminent person. His works include *A Candid Examination of Theism*, 1878, *Animal Intelligence*, 1881, *Charles Darwin*, 1882, *Mental Evolution in Animals*, 1883, *Jelly-Fish, Star-Fish, and Sea-Urchins*, 1885, *Mental Evolution in Man*, 1888, and *Mind and Motion and Monism*, 1896.

Romanesque Architecture, see *ARCHITECTURE*, V.

Romani Language, see *INDO-EUROPEAN LANGUAGES*; *GYPSIES*.

Romania, see *Rumania*.

Romania, name sometimes applied to the Lat. kingdom founded at Constantinople in 1204 by Baldwin, count of Flanders, and other crusaders who captured Constantinople and made Baldwin king. The kingdom had a stormy existence and came to an end in 1261, when Michael Paleologus, the Byzantine emperor, recaptured Constantinople. See *under* *BYZANTINE EMPIRE*; *BALDWIN I.*

Romanino, Girolamo (1485-1566), It. painter, b. Brescia. He painted chiefly in his native city, and was a fine colourist, influenced in style by Giorgione and Titian. Among his works are 4 frescoes in the cathedral of Cremona (1519-20); a 'Madonna' in the Doria Gallery at Rome; a 'Nativity' in the National Gallery in London, and one at Brescia.

Romano, Giulio, see *GIULIO ROMANO*.

Romanov, House of, ruling house of Russia from 1613 to the Feb. revolution (q.v.) in 1917. The first tsar of the H. of R., Michael Fëdorovich (q.v.), of an old boyar (q.v.) family, was elected at the end of the Time of Troubles (q.v.) by a specially summoned Zemskiy Sobor (q.v.). From Peter the Great the Romanovs bore the title of emperor. The order of succession was by male primogeniture until Peter the Great, who introduced the principle of the reigning monarch choosing his successor, which was followed until Paul I (q.v.), who reverted to the previous system. The male line of the Romanovs died out with Peter II (1730). The emperors from Peter III (1762) onwards

belonged in fact to the family of Holstein-Gottorp (related to the Romanovs through Peter the Great's daughter), but assumed the name of Romanov. See also NICHOLAS II.

Romans, Epistle to the, unanimously accepted as a genuine epistle of St Paul, forming, indeed, part of the central group of his writings, with 1 and 2 Cor. and Gal. It is an orderly exposition of the principles of the Christian religion and salvation in Christ as opposed to Jewish legalism. It is the longest of the apostle's writings, and possibly the greatest, containing an epitome of his whole doctrine. It was written from Corinth on the third missionary journey (c. AD 56), and the apostle apparently anticipates visiting Rome (Rom. xv. 24), where he has many friends (Rom. xvi). It is clear that he holds this predominantly Gentile church in high esteem (Rom. i. 8). He hopes to make Rome the centre of fresh missionary labours in the W. (Rom. i. 15). The main theme of the epistle is the relationship between Jew and Gentile, and their common salvation through the death of Christ. There are 3 main parts: a doctrinal treatise on the universal need for salvation and the life according to faith (I-xi), an exposition of Christian morality (xii-xv), a more intimate and personal conclusion (xvi-xvii). It is admittedly the most difficult of St Paul's writings, and this is due in part to rapid transitions and grammatically confused sentences, and in part to the technical language. See J. B. Lightfoot, *Notes on the Epistles of S. Paul*, 1895, 1904; P. M. J. Lagrange, *Épître aux Romains*, 1918; Williams in *A New Commentary* (ed. C. Gore, etc.), 1928.

Romans-sur-Isère, Fr. tn in Drôme dept., on the R. Isère, 11 m. NE. of Valence. St Bernard founded an abbey here in 837. The abbey church (12th and 13th cents.) was damaged in the Second World War. R. is a tanning and leather-working centre. Pop. 19,000.

Romansch (also *Romansh* or *Rumansh*; the native term is *Romaunsh*; the word is obviously connected with 'Roman') is the fourth, and most recent, national and official language of Switzerland (the other three being German, French, and Italian). R. is mainly spoken in Grisons (Graubünden, Grigioni, R. Grishun), the largest of the Swiss cantons (occupying over one-sixth of the national ter.), but the most sparsely populated. Only in the Engadine valleys do the R. speakers form a majority (about two-thirds) of the inhab. R. is steadily losing ground, and has done so since ancient times. In pre-Rom. times the pop. of the riv.-valleys of the It. Alps spoke Rhaetic dialects and employed the N. Etruscan alphabet (see ALPHABET). During the Rom. occupation (since the late 1st cent. BC) the Rhaetians became completely Romanised. Under the pressure of Ger. speakers R. retreated more and more. There are traces of R. being spoken in the 16th cent. in Mallers and Nuders, and in the Passet valley in Tirol, and in Hirschensprung in Vorarl-

berg, but even to the N. of Hirschensprung R. was previously spoken, the last Romance document, however, belonging to the 8th cent. At Pfäfers, Ragas, Sargans, and Montafon, as well as on the Rhine between Tamins and Malenfeld, R. disappeared in the 14th cent.; at Chur (or Coira), in the late 16th cent.; at Davos, Seewis, and Surses, in the 17th cent. In some places it lingered on until a cent. ago (Samnaun); in other places it is now in process of extinction. Many dists. are still bilingual (R. and German): Bonaduz, Rothenbrunnen, Rodels, Almens, Sils, Cazis, and so on. R. can be divided into 4 main dialects: Sursilvanian, Subsilvanian, Upper Engadine, and Lower Engadine. Apart from these vulgar dialects there is the literary language, which has become the aforementioned fourth national language of Switzerland.

The relationship of R. with other Romance languages (q.v.) and dialects is uncertain. According to the It. linguist G. I. Ascoli (1873), R. was the W. of the 3 sub-groups of a group of Romance dialects, which he called Ladin (q.v.), from the Engadine term for the local language, *ladin* (= Lat.); the central sub-group being constituted by the dialects spoken in the semi-Ladin basins of Noce and Avisio S. of Fassa, in Amnezzo and beyond Chiava, in Upper Cordevole and Comelico (i.e. roughly in the It. prov. of Venezia Tridentina); and the E. group being formed by the dialect spoken in Friuli (It. prov. of Udine), by about 800,000 people. This group has been called *Rettoromanisch* by T. Gartner (1883) and is also termed in Eng. 'Rhaeto-Romance' dialects. According to this theory, the 3 sub-groups are remains of 1 main group of dialects, originally spoken in the S. Alps from the Toce to Risans and later reduced to 3 linguistic ls. by the expansion of German in the N. and of It. dialects (Lombardic and Venetian) in the S. Ascoli's compatriot C. Battisti denies this historical and linguistic connection between the 3 'sub-groups,' and considers R. an independent group of dialects of the Romance languages.

Romanshorn, tn in the canton of Thurgau, Switzerland, on the SW. shore of Lake Constance, 11 m. SE. of Constance. It is the centre of an important transit trade, and has industrial estab. and fisheries. Pop. 6700.

Romantic Movement, term applied to a general artistic upheaval which culminated about 1830-40. It was a reaction against the accepted formulas of so-called 'classical' art, and although it may be regarded as having originated in the field of Ger. literature in the later 18th cent. (e.g. Lessing and Schiller), it rapidly embraced the whole of European art. The relative aims of classical and romantic art were summed up by Heine as follows: 'Classical art had to express only the finite, and its forms could be identical with the artist's idea; romantic art had to represent, or rather to typify, the infinite and the spiritual, and had

therefore to be expressed symbolically. Classical art may be said to possess objective beauty, since universal types are presented, the artist being chiefly a technical medium of realisation. Romantic art, on the other hand, is subjectively beautiful, since individual impressions are presented, the artist being primarily a psychological medium of interpretation.

croix; and in music, Berlioz, Weber, Chopin, Schumann, and Meyerbeer. In these sources nearly all the important developments in modern art originated. See C. E. Vaughan, *The Romantic Revolt*, 1907; D. G. James, *The Romantic Comedy*, 1948.

Romanu, see ROMAN.

Romany, see GYPSIES.



PRINCIPAL LANDMARKS OF ROME

The rules evolved from classical tradition were not suited to romantic ideals; the former aimed at symmetry of outline and perfection of form, whilst the latter aimed at the expression of individuality. The R. M. therefore discarded formal beauty in favour of emotional intensity. The leading figures in the R. M. were in Eng. literature: Scott, Shelley, Byron, Wordsworth; in Ger. literature, Goethe, Heine, Tieck, and Hoffmann; in Fr. literature, Hugo, de Musset, George Sand, and Sainte Beuve; in painting, Delaroche and Dela-

Rome, King of, see NAPOLEON II.

Rome (It. Roma): 1. Prov. of Italy, in central Lazio (q.v.). It is mainly low-lying (see CAMPAGNA DI ROMA), but is mountainous in the N. and W., and also in the SW., where are the Alban Hills (q.v.). The prov. is watered by the Tiber and the Aniene (qq.v.); Lake Bracciano (q.v.) in the N. is drained by the Arnone. The prin. tns include R., Tivoli, Subiaco, Frascati, Velletri, Civitavecchia, and Anzio (qq.v.). Area 2075 sq. m.; pop. 2,279,000.

2. City of Italy, cap of the It. Rep. and of the prov. of R. It was once the cap. of the Rom. Republic and of the Rom. Empire (*see ROMAN HISTORY*); later it was the cap. of the States of the Church (q.v.), and, from 1871 to 1946, of the Kingdom of Italy. Until the Reformation (q.v.) it was the centre of the whole of W. Christendom. It stands on the Tiber (q.v.), 15 m. from its mouth, at the S. edge of the Etruscan hill country, overlooking the plain of the Campagna di Roma (q.v.). The riv. flows through the city on a tortuous N.-S. course: on the l. b. (E.) is the larger part of the anct and of the modern tn; on the r. b. (W.) are the Vatican City (q.v.) and some residential and industrial (e.g. Trastevere) quarters. The Seven Hills, all on the E. side of the Tiber, are still recognisable: the Palatine (q.v.) lies in a central position, with the Forum (q.v.) below it to the NE., and is covered with anct ruins; the Capitoline (*see CAPITOL*), which—apart from the Victor Emmanuel monument—has suffered little change since the 16th cent., is farther NW.; and lying in a curve from N. to SW. are the remaining 5 Hills, the Quirinal (q.v.), Viminal, Esquiline, Coelian, and Aventine. The active business life of the city is centred in the lower ground between the Hills, the Pincio quarter, and the riv. This lower portion, with the vicinity of the Vatican and Trastevere, formed the medieval city, but few secular buildings of medieval date remain. The sack of R. in 1527 by the Constable of Bourbon (*see CHARLES DE BOURBON*) prepared the way for a great era of rebuilding and enlargement. Most of the great palaces and also of the churches were erected or remodelled in the 17th and 18th cents. Between 1870 and the First World War the city again underwent drastic reconstruction. New quarters on the N. and E. were erected, and central R. was developed to meet modern needs. The Tiber (which was formerly liable to inundate the low-lying areas) was deepened where necessary and enclosed by embankments, upon the medieval model of the Arno at Florence (q.v.). Under the Fascist regime (*see FASCISM*) more alterations were made. The aim of Mussolini was to revive R.'s anct grandeur, and to link the historical glories of the Caesars with the achievements of the Fascist Empire. A great new thoroughfare, the Via dei Fori Imperiali (formerly the Via dell'Impero), was built from the Colosseum (q.v.) NW. to the Piazza Venezia, a large square from which radiate broad avenues, and which contains the massive monument to Victor Emmanuel II (q.v.); the Palazzo Venezia (mid-15th cent.) was used by Mussolini as offices. The Via dei Fori Imperiali opened up a magnificent view of the relics of anct R., though its construction involved the bisection of the Imperial Fora. Much work was done to lay bare the remains of the Palatine and the Forum so that they might be permanently visible. Many medieval and later buildings were demolished in order

to excavate Rom. remains, and a public park, the Passeggiata Archeologica, was formed in the area on both sides of the Appian Way (q.v.), bounded by the city wall. The city grew considerably under the Fascist regime, and a number of blocks of modern flats were built, both within old R. itself and in the suburbs. Of the important older streets, the Via Lata (the Corso), the Via Giulia (1505-10), and the Via dei Banchi remain much as they have been for cents., and the densely peopled centre of R., between the Corso and the Tiber, is of such solid and dignified construction that the work of the 16th and 17th cents. serves the needs of to-day. Of the great squares, the Piazza Navona, the Campo dei Fiori, and the Piazza del Quirinale, as well as the Piazza Venezia, survive; the Piazza di Spagna and the Piazza del Popolo (at the end of the Corso and at the beginning of the Flaminian Way, q.v.) are of more modern date.

From the Colosseum the Via di San Gregorio runs past the Arch of Constantine (c. AD 315) and the Baths of Caracalla (AD 206) to the Appian Way. Another great street, the Corso Vittorio Emanuele, leads NW. from the Piazza Venezia to the riv. It crosses the Campo Marzio (Martial Field) dist., which lies in a loop of the Tiber and contains numerous old buildings, amongst which are sev. Renaissance palaces, including Farnese (q.v.), Spada, Altieri, and Madama. Here also is the Pantheon (q.v.). From the Corso Vittorio Emanuele a bridge across the riv. leads to the Vatican City, and another, the beautiful Ponte Sant'Angelo (the central arches of which date from Hadrian's time), leads to the Mausoleum of Hadrian (*see HADRIANUS*), a building, now known as the Castel Sant'Angelo, which was converted into a fortress in the Middle Ages and has served as a meeting-place for Church councils, a refuge for the Pope, and a prison. In the neighbourhood of the Corso there are sev. notable palaces of the 17th cent., including the Chigi (*see CHIGI family*), which is now the Foreign Ministry, Doria, and Sciarra Colonna. To the E. of the Piazza del Popolo is the Villa Umberto I (formerly the Villa Borghese, q.v.; *see BORGHESI PALACE*), built by Cardinal Scipione Caffarelli-Borghese early in the 17th cent.; it is now a sumptuous museum of sculpture and of painting. The Villa stands in the largest of R.'s public parks, which is connected with the Pincio gardens, a famous promenade, situated high above the city to the N. Another public park has been laid out on the heights above Trastevere, on the Janiculum hill (q.v.); here there is a great statue of Garibaldi (q.v.). The Via Condotti runs E. from the Corso to the baroque Spanish Steps (of which there are 137), leading from the Piazza di Spagna to the church of Santa Trinita dei Monti and the Villa Medici. The house in which Keats d. is on the right of the steps. The numerous churches of R. include 5 greater or patriarchal basilicas:

San Giovanni in Laterano (St John Lateran), which is the archbasilica for the Pope as Patriarch of the W.; San Pietro (St Peter's), for the Patriarch of Constantinople; San Paolo fuori le Mura (St Paul's-outside-the-Walls), a church founded by Constantine (see CONSTANTINUS I) over the grave of the Apostle, and rebuilt in 1823, the basilica of the Patriarch of Alexandria; Santa Maria Maggiore (St Mary Major's), the basilica of the Patriarch of Antioch, dates back to 352 and has the highest campanile (1377) in R.; and San Lorenzo fuori le Mura

(q.v.). Systematic archaeological investigation under the site of St Peter's in recent years has led to the discovery of a complete Rom. cemetery, with pagan and early Christian tombs, dating from the middle of the 2nd to the end of the 3rd cents. AD. It came as a surprise that no trace was found below St Peter's of the circus of Caligula and Nero or of the Via Cornelia, both of which are shown by all the topographers of anct R. under the Vatican basilica. It would appear from the indications given by the Elder Pliny and Tacitus that the circus lay within the



By courtesy of the Italian State Tourist Office

THE RAILWAY TERMINUS, ROME

(St Lawrence's-outside-the-Walls), which has been restored after being damaged in the Second World War, is for the Patriarch of Jerusalem, but is not always accounted a major basilica. San Giovanni in Laterano (see LATERAN CHURCH OF ST JOHN), before which is a noble piazza, stands on the S.E. border of the city, and is described over its entrance as *Omnium urbis et orbis ecclesiarum mater et caput* (the mother and head of all churches of the city and of the world). The Lateran Palace, which adjoins it, was the papal residence from the time of Constantine until the exile of the papacy to Avignon (q.v.); the present palace was erected in the 16th cent. at the same time as the Quirinal Palace. St Peter's basilica (q.v.), which is the largest church in the world, is in the Vatican City; before it is the beautiful Piazza designed by Bernini

and probably to the S. of the Old Grottoes or crypts of St Peter's. Further archaeological excavations have been directed to the location of the tomb of St Peter under the basilica. The Vatican Palace (q.v.), which adjoins St Peter's is the residence of the Pope. Amongst other churches of antiquity and interest are S. Pietro in Vincoli (which contains the chains that fettered St Peter in R. and in Palestine), S. Maria in Trastevere, Santi Quattro Coronati, S. Agnese, S. Maria in Cosmedin (which was built before the 6th cent. on the remains of a pagan temple), S. Sabina, S. Saba, Ava Caeli, and S. Maria sopra Minerva. Certain churches were built into pagan edifices, such as the Pantheon and S. Maria Aniqua, the latter of which was excavated in recent years on the edge of the Forum. Many contain mosaics of

the 4th and 5th cents., and sculptured work of the classical age. Through these churches is maintained the continuity of anct and modern R., for of secular buildings of antiquity other than ruins little survives in continuous use excepting the theatre of Marcellus, the mausoleums of Augustus and of Hadrian, and parts of the Capitol.

Of the many Renaissance and baroque fountains for which R., in common with other It. cities, is known, the most notable is the magnificent Fontana di Trevi, near the Quirinal, which fronts the entire façade of the palace of the Dukes of Poli. It was constructed in 1762 by Nicolò Salvi. Other fine fountains are those of Paola, Felice, and Marcia.

Of the anct city gates sev. are preserved and are still in use. The Porta del Popolo is the historic entrance from the N. The Porta Pia, in the E. wall, is that by which the It. troops forced their way into the city in 1870. The Porta S. Giovanni, by the Lateran, is the starting-point of the road to Naples, and the Porta Tiburtina is the starting-point for Tivoli, Sulmona, and the central Adriatic coast. At the Porta Sebastiano begins the Appian Way, bordered by anct tombs and retaining long sections of the anct paving.

The chief museums are the vast papal collections (dating from the 15th cent.) of the Vatican, which include fine sculpture, Christian inscriptions, coins, and Etruscan and Egyptian objects, as well as the famous picture galleries and the wall-paintings of Raphael ('Stanze' and 'Loggia'), Michelangelo, and Pinturicchio. The Vatican library, though not extensive, is perhaps the richest in the world in important MSS. (see LIBRARIES). The Lateran museum, the Capitol, the Thermæ, and many others are of great interest. Other public collections of paintings are the Corsini and the Galleria d'Arte Moderna, and private collections include the Barberini, Doria, Albani, and Colonna. The univ. of R. was founded in 1303 by Pope Boniface VIII, with the Bull *In Supremae praesentia dignitate*. It reached its height under Pope Leo X (q.v.). To-day it has some 40,000 students. There are many colleges and seminaries for training Rom. Catholic clergy; some of these are national colleges of different countries. There are schools of history, archaeology, architecture, and music, and there are numerous foreign institutes. The It. Senate and Chamber of Deputies meet in the city, and the public offices and law courts are centered here also. The public services of the city are modern and efficient. The transport system is highly organized; a 7-m. underground railway, skilfully engineered to avoid disturbances to anct monuments, was opened in Feb. 1955, between the Termini main line station and Laurentina in the SW. suburbs.

None of R.'s historical monuments suffered serious damage during the Second World War; the damage done to San Lorenzo fuori le Mura was quickly repaired. This damage (as well as 2 breaches in the

Aurelian Wall) was caused during the first Allied air-raid on R., the target being the railway marshalling yards, on 19 July 1943. On 13 Aug. a heavy raid was made on military objectives near the city. On the next day R. was declared an open city by the Badoglio (q.v.) gov., and in Sept. it was abandoned by the gov. and the royal family. It was then garrisoned by the Germans. The real battle for R. began in May 1944, when fierce fighting took place in the Alban Hills. The Fifth U.S. Army entered the city on 4 June, and R. became the seat of the It. gov. 11 days later. Pop. 1,699,000.



Anderson

ROME: THE ANTONINE COLUMN

A pillar in the Piazza Colonna, raised by the Senate in commemoration of the victories of Marcus Aurelius Antoninus over the Marcomanni and other German tribes.

See ITALIAN FRONT, SECOND WORLD WAR CAMPAIGNS ON. See also N. Young, *The Story of Rome*, 1901; E. Steinmann, *Rom in der Renaissance*, 1908; E. Hutton, *Rome*, 1909; H. Stuart-Jones, *Classical Rome*, 1911; E. V. Lucas, *A Wanderer in Rome*, 1926; G. Lugli, *I Monumenti antichi di Roma e suburbio*, 1930-40; F. Male, *Rome et ses vieilles églises*, 1942; L. Curtis, *Das antike Rom*, 1944; J. More, *The Land of Italy*, 1949; H. V. Morton, *A Traveller in Rome*, 1957; J. Toynbee

and J. W. Perkins, *The Shrine of St Peter and the Vatican Excavations*, 1936.

Rome: 1. City, cap. of Oneida co., New York, U.S.A., on the Mohawk R. and Erie Canal, 15 m. NW. of Utica, in a dairy-farming and market-garden dist.; it manufs. brass and copper products, machinery, heating and coaling equipment, paints, textiles, clothing, and sporting goods; there is also food and fruit packing. Pop. 41,682.

2. City, co. seat of Floyd co., Georgia, U.S.A., 55 m. NW. of Atlanta; it has iron foundries and cotton and lumber mills. Shorter College is here. Pop. 29,615.

Rome, Prix de, highest award given to the pupils of the R. Academy of Fine Arts. It gives access to the Académie de France à Rome. There are minute rules governing the award, which is much coveted.

Rome-Berlin Axis, see **AXIS**.

Rome Scholarships, Brit. academic awards in painting, sculpture, archaeology, hist., etc., made by the faculties of art in those subjects of the Brit. School at Rome, founded in 1913. A Brit. student awarded a Rome scholarship spends 2 years in Rome studying his subject.

Römer, Ole, or **Olaf**, or **Olaus Christensen** (1644-1710), Dan. astronomer and mathematician, b. Aarhus, Denmark. He went to the univ. of Copenhagen in 1662, where he made a special study of mathematics and astronomy. After leaving the univ. he became assistant to Picard and Cassini at the Observatory of Paris, and soon afterwards was made tutor to the Dauphin and was given a pension by Louis XIV in 1672. In Sept. 1676 he announced to the members of the Paris Académie des Sciences that the eclipse of the inner satellite of Jupiter, which was expected on 9 Nov. 1677, would be 10 min. later than the time computed on the basis of the previous eclipses, and the following year the eclipse took place in accordance with his prediction, thus proving conclusively that the velocity of light was finite. In 1681 he returned to Denmark as prof. of mathematics at the univ. of Copenhagen and soon afterwards was appointed Astronomer Royal to Christian V, who quickly recognised his ability in other spheres. Early in the next cent. he was made mayor of Copenhagen and prefect of the police, and also a senator and head of the state council. See R. Horrebow, *Basis Astronomiae*, 1735.

Romford, municipal and parl. bor. and mkt. tn of Essex, England, 12 m. ENE. of London, on the Rom. It is noted for its mkt. There was a Rom. station called Durolitum here. The parl. constituency of R. includes the urb. dist. of Brentwood. Pop. 104,000.

Romilly, Sir Samuel (1757-1818), lawyer and reformer, b. London, and educ. privately and at Gray's Inn. He was called to the Bar in 1783, and took silk 17 years later. He entered Parliament in 1806 and in that year was solicitor-general in the short-lived second Grenville administration. He effected many legal

reforms, helping to mitigate the severity of the criminal laws; it was R. who secured the abolition of the death penalty for many classes of petty crime. R. joined in the anti-slavery agitation, and opposed the suspension of the Habeas Corpus Act. His promising career was cut short by his suicide. He wrote *Observations on the Criminal Law of England as it relates to Capital Punishment*, 1818. See life by C. G. Oakes, 1935.

Romilly-sur-Seine, Fr. tn in the dept of Aube, 23 m. NW. of Troyes; it has manufs. of hosiery and needles, and there are railway shops. Pop. 13,000.

Rommel, Erwin Johannes Eugen (1891-1944), Ger. soldier, b. Heidenheim, near Ulm, Württemberg. He joined the Army in 1910, and was commissioned in 1912. During the First World War R. served in France, Rumania, and Italy, was decorated with the Iron Cross, Class I, and the *Ordre pour le Mérite*, and was promoted capt. in 1917. After the war he was a company commander at Stuttgart until 1929, when he was appointed instructor at the War Academy, Dresden. Having been promoted lieutenant-colonel in 1935 he received a similar post at the War Academy at Potsdam. In Nov. 1938 R. was commandant of the War Academy at Wiener Neustadt. On the outbreak of the Second World War he held the rank of maj.-gen., and was given command of the 7th Panzer Div. in Feb. 1940, and on 12 June R. received the surrender of Maj.-Gen. Fortune, 4 Fr. gens., and 12,000 allied troops at St Valéry-en-Caux in Normandy. He was awarded the Knights' Cross of the Iron Cross.

After the defeat of Graziani in Libya R. was appointed to command Ger. troops there, which at first consisted only of the 5th and 9th Light Divs. He was promoted lieutenant-gen. in Jan. 1941. (For R.'s campaigns in Libya and Egypt see **AFRICA**, **NORTH**, **SECOND WORLD WAR**.) For his advance in the summer of 1942 from Gazala to Alamein, R. was promoted field marshal and decorated. But he was not adequately supplied with ammunition and reserve tanks; at one time he had only 12 Ger. tanks in running order. Between then and the arrival of Montgomery (q.v.) on 15 Aug. he had to beat off 6 Brit. counter-attacks before he could again seek a decision at Alam Halfa on 31 Aug. During the 4 days of this battle he was ill, and on 24 Sept. was flown home to hospital, on the way seeing Hitler, to whom he appealed for more supplies and motorised troops. On 24 Oct., at the height of the Alamein battle, Stumme, his successor, died, and R. was flown from hospital to conduct the last battle and the withdrawal to Tunisia. His request for more motorised troops had not been granted. The 164th Infantry Div. and the Ramcke Brigade of 4 parachute battalions were his only reinforcements. From now until the end of the campaign R. was a sick man. In Nov. he again saw Hitler, who finally promised support. This, however,

was not forthcoming. Ger. reinforcements were indeed poured into Tunisia, but R. did not get control of these until 22 Feb. 1943, when he became commander-in-chief Army Group Africa. At Kasserine Pass in that month he inflicted a heavy defeat on the Amer. 2nd Corps, but his counter-attack against the Eighth Army failed at Medenine on 5 Mar. A week later R. flew to Gormany, where (according to his family) he asked Hitler for permission to evacuate his troops, but this was refused, and he was accused of cowardice. He was in hospital for some weeks, and on 12 May again saw Hitler, who said to him: 'I should have listened to you earlier. Africa is lost now.'

After the allied victories in N. Africa R. was given command of troops in N. Italy. Despite his misgivings as to the North Sea and Atlantic defences in Jan. 1944, he accepted command of Ger. troops in Holland and of the Fifteenth and Seventh Armies in N. and NW. France. (For the summer campaign of 1944 see WESTERN FRONT IN THE SECOND WORLD WAR.)

On 17 July R. was severely injured when his car was shot up by the R.A.F. He was suspected of complicity in the plot against Hitler (June 1944). When at home on convalescent leave he was offered the alternatives of trial before a people's court or suicide by poison. He chose the latter, and d. 14 Oct.

On the professional plane R. has been dismissed as a brilliant tactician but an indifferent organiser. If this were so he could never have succeeded in the desert, which, as Gen. von Thoma, a later commander of the Afrika Korps, has said, was 'a tactician's paradise, but a quartermaster's nightmare.' His largest command in Africa was only a tactical one. Questions of supply were decided for him before the material left Europe, and R. suffered from the inefficiency of Cavallero and the enmity of Kesselring (q.v.). See A. Moorehead, *African Trilogy*, 1946; M. Shulman, *Defeat in the West*, 1947; H. B. Glasevius, *To The Bitter End*, 1949; U. von Hassel, *Diaries*, 1948; H. Speidel, *Invasion, 1944*, 1949; D. Young, *Rommel*, 1950; and B. H. L. Hart, *The Rommel Papers*, 1953.

Romney, George, (1734-1802), artist, b. Dalton-in-Furness, the son of a cabinet maker. He early showed a taste for drawing, and was apprenticed to Edward Steele, the portrait painter, who lived at Kendal. R. came to London in 1762, and painted many pictures, travelling abroad to study when he could afford to do so. His portraits became popular, and he became a professional rival of Sir Joshua Reynolds. Perhaps his most famous sitter was Lady Hamilton, of whom he painted many likenesses. In his later years he suffered from despondency and ill health. After his death his works were little sought, but this unnatural reaction passed, and to-day they are of considerable value. R. excelled in portraying the Eng. beauties of the day; he could express character in the simplest of pictures, such as 'The Parson's

Daughter,' though his unfulfilled ambition was to paint grandly imaginative themes. See lives by R. S. Gower, 1804; H. Ward and W. Roberts, 1904; and B. L. K. Henderson, 1922.

Romney, New, municipal bor. and Cinque Port, Kent, England, 22 m. SW. of Canterbury. It is now about a mile from the sea, its harbour having silted up in the 13th cent. The par. of N. R. contains the watering-places of Littlestone-on-Sea and Greatstone-on-Sea. Pop. 2300. Old Romney is a par., 2 m. W. by N.

Romney Marsh, level tract of rich sheep pasture, Kent, England, near Rye, protected against the sea by a huge embankment and by a drainage system, under the management of an anct corporation known as the Lords of R. M. Area 24,950 ac. There are sev. villa.

Romney Marsh Breed, see SHEEP.

Romneya, a genus of 2 Californian herbaceous perennials, family Papaveraceae; *R. coulteri*, *R. trichocalyx*, and their hybrids being grown for their large poppy-like flowers.

Romorantin, Fr. tn, cap. of an arron., in the dept of Loir-et-Cher, on the Sauldre. The edict advocating religious tolerance issued from R. in 1560 was defended by Michel de L'Hôpital (q.v.) before the parlement of Paris. Textiles and shoes are manuf. Pop. 7900.

Romsdal, valley in Norway, fylke of Møre SW. of Trondheim, extending from Mt Snehaten (7570 ft) W. and NW. to the Atlantic; is noted for its fine scenery, particularly in the valley of the Rauma and the peaks of Romsdalshorn (5095 ft) and Trolltindane (6010 ft). Cap. Molde. Area 5787 sq. m.

Romsey, municipal bor. and markt tn of Hants, England, 8 m. NW. of Southampton, on the Test. It has a brewery, jam manufs., and sev. other industries. The fine Norman Abbey church of St. Mary and Aethelred dates from the 12th cent., being originally the church of a Benedictine nunnery. Another notable building is King John's Hunting Box (c. 1206), now the tn museum. There is excellent fishing in the R. Test; R. is a good centre for the New Forest. Pop. 6389.

Romuald, St (c. 950-1027), It. monastic reformer, b. Ravenna of the ducal family of the Onesti. He became a Benedictine at Classe, near Ravenna, and was abbot there from 996 to 999. In the latter year he resigned and led a wandering life in central and N. Italy, and the Pyrenees. He estab. sev. religious houses, the most famous being the monastery of Camaldoli, near Arezzo (1009), which still exists and is the home of the Camaldolese (q.v.). R. attempted sev. times to go as a missionary among the Slavs. His feast day is 19 June; 7 Feb. commemorates the translation of his relics from Val di Castro to Gabriano.

Romulan Calendar, see CALENDAR.

Romulus, mythical founder of Rome, son of Mars and Rhea Sylvia, and twin brother of Remus. They miraculously

escaped drowning, and were reared by a she-wolf, finally receiving protection from the herdsman Faustulus and his wife. On reaching manhood, they expelled the usurper, Amulius, and restored his brother, their grandfather Numitor, to the throne of Alba. They then asked his permission to build a city on the Tiber, but quarrelled over its site and name. R. killed Remus for laughing at his walls on the Palatine. He made the Capitol an asylum for refugees and adventurers, and provided wives for his citizens by the 'rape of the Sabines.' The resulting war ended in the joint rule of Tatius, King of the Sabini, and R. Later R. reigned alone, was carried up to heaven, and worshipped as the god Quirinus by the Romans. R. derived from the place-name Rome, and not Rome from R., as the legend pretends. Quirinus was a god whose name derived from *populus Romanus Quiritium*; his identification with R. was natural. Rom. tradition connected a *niger lapis* with the tomb of R. This *niger lapis* was unearthed in 1899 near the church of St Hadrian by G. Boni, but R.'s tomb was shown to be no tomb at all. See G. De Sanctis, *Storia dei Romani*, 1907; E. Pais, *Storia critica di Roma*, I, 1913; S. B. Platner, *A Topographical Dictionary of Ancient Rome*, 1929.

Romulus Augustulus, see AUGUSTULUS.

Ronald, Sir Landon (1873-1938), conductor and composer; b. London, a son of Henry Russell, composer of popular songs. He received his musical training at the Royal College of Music, London, and assumed the surname of Ronald. He first appeared as a pianist in Wormsley's wordless play, *L'Enfant prodigue*, 1891. From that year he was accompanist at Covent Garden, and toured with Melba in America, 1894. From 1908 R. conducted the Albert Hall Orchestra, and he was principal of the Guildhall School of Music from 1910. R. was knighted in 1922. He composed incidental music, songs, ballet music, and orchestral works of a popular kind.

Ronaldshay: 1. North, most northerly of the Orkney Is., Scotland, 2½ m. NNW. of Sanday, from which it is separated by the N. Ronaldshay Firth. Area 4 sq. m. Pop. 175.

2. South, most southerly of the Orkney Is., Scotland, 6 m. NNE. of Duncansby Head, containing the vil. of St Margaret's Hope. The surface is level and well cultivated; it is connected to Mainland Is., Orkney, by Churchill Barrier. Length 8 m. Area (including adjacent Is.) 18 sq. m. Pop. 1512.

Roncesvalles (Fr. Roncesvaux; Basque Orhla), Sp. vil. in the prov. of Navarra, on a pass over the Pyrenees into France. Here, in 778, as Charlemagne (q.v.) retreated from Zaragoza into France his rearward was attacked by the Navarrese, and Roland and Oliver were slain (see ROLAND, CHANSON DE). The Black Prince (q.v.) used the R. pass in 1367. There is a convent, with a library and a museum. Pop. 200.

Ronda (Rom. Arunda), Sp. tn in the prov. of Málaga, standing on the edge of a rocky plateau, and divided in two by a gorge (525 ft deep, 200-70 ft wide). S. of the gorge is the old Moorish tn, with fine walls, a ruined castle, and ancient churches; on the N. is the newer dist. of Mercadillo. The first school of bullfighting was estab. in R., and there is a trade in wine, leather goods, and horses. Pop. 30,000.

Rondeau, verse-form of Fr. origin. The word is a later form of Rondel; modern usage, following the practice of Banville, has estab. an arbitrary distinction between the rondel (q.v.) and the R., but this is not universally observed.

The term occurs in the 13th cent., when it is applied to the music of the words accompanying a dance or 'round'; Guillaume d'Amiens and Adam de la Halle use the term, but the structure of their poems is very varied, both in metre and in the number of lines. Already, however, the lines fall into 3 groups, the whole of the first line coming as a refrain at the end of the second and third groups. In the 14th cent. the R. passed from the musical to the literary sphere. Various types are found in the works of Eustache Deschamps. Of these, 2 mainly survive, the form used by Charles d'Orléans in *Le temps a laissé son manteau* being described as a rondel. This has 13 lines on 2 rhymes, grouped in 3 stanzas of 4, 4, and 5 lines (the first 2 lines recurring as the third and fourth of the second stanza and the first line being repeated as a refrain at the end of the third stanza). The most usual rhyme scheme is ABba, abAB, abbaA, where capitals indicate the repeated lines.

During the 15th cent., perhaps through misinterpretation of copyists' abbreviations, the refrain was reduced to the repetition, outside the rhyme scheme, of the first half of the first line. This second type was used by poets until the 17th cent., when the form dropped out of use until its revival in the 19th cent. The pattern, the second type now regarded as standard, is that used by Voltaire; it consists of 13 lines, on 2 rhymes, grouped in 3 stanzas of 5, 3, and 5 lines with partial refrain after the eighth and last lines. The usual rhyme scheme is aabba, aabR, aabbaR, but later poets, e.g. de Musset (q.v.), have varied this.

Rondebosch, residential suburb of Cape Town (q.v.), S. Africa, 5 m. S. of the city. Here are Groote Schuur, the official residence of the Prime Minister, and the Cape Town Univ. on the mt slopes above R.

Rondel: 1. Synonym of rondeau (q.v.).

2. In modern usage, restricted to the *rondel* of 15 lines as used by Charles d'Orléans. Some poets repeat the first and second lines at the end of the poem, thus making 14 lines.

Rondo (Fr. *rondel*), musical composition, most important musical form since the 18th cent., next to sonata-form, and frequently forming part of a sonata-form work, especially as the finale. Its general principle is that of a return to an initial

theme, as to a refrain, with different episodes between. The Fr. *rondeau* of the 18th cent. was merely a matter of detached sections, the first of them recurring after each of the incidental ones, which were called *couplets*. Later the episodes became linked to the prin. theme by transitions, and the highest development of the R. was, especially in Mozart's hands at first, the so-called sonata-R. form, where one of the episodes appeared at first in a key related to the tonic and returned as another episode in the tonic key, exactly like a second sonata subject. Like a sonata movement, a R. may have a coda; much more rarely one of the episodes may be in the nature of a thematic working-out. The recurrences of the theme are often saved from monotony by (e.g. Mozart) abbreviation or (e.g. Beethoven) variation.

Renne, seaport of Denmark, cap. of Bornholm is. (q.v.), situated on the W. coast of the is. The harbour has been deepened, and there are shipyards and kaolin pottery manufs. Occupied by the Germans in the Second World War, the tn was badly damaged by Russian bombers in 1945, but has been rebuilt since. Pop. 13,160.

Ronsard, Pierre de (1524-85), Fr. poet, b. Château de la Poissonnière, Vendômois, son of Loya de R., *maître d'hôtel* to the Dauphin. R. left the Collège de Navarre to become page to the Dauphin, and accompanied James V and Madeleine of France to Scotland, where he spent 2 years. He then lived at the Fr. court until, at 18, deafness dashed his hopes of preferment. R. found comfort in learning and studied Greek under Dorat. R. collaborated with du Bellay in writing *Défense et illustration de la langue française*, 1549, which inaugurated a new literary age, that of classicism, and then began to publish poetry of the kind advocated in the manifesto. Until the death of his benefactor, Charles IX, in 1574, R. lived at court and at his home in Touraine, much patronised and famous. He spent his last years in quiet retirement in Touraine. Few poets have achieved such glory during their lifetime as R. Kings and queens treated him as their equal; Mary of Scotland, Elizabeth of England, and Charles IX loaded him with admiration and honours. R.'s poetic work falls into 4 periods: 1550-4 (Pindaric odes); 1554-60 (Anacreontic inspiration); 1560-74 (court poems); 1574-84 (*Sonnets pour Hélène*); of these periods the second and fourth are the finest. His greatness as a lyric poet lies in his evident sincerity, his feeling for the fragility of human life and beauty, his fondness for natural beauty; he has been called 'the poet of the roses.' His chief faults are his tendency to diffuseness, and undue imitation of the classical poets and Petrarch, but his poetry has variety, force, and a rich, musical beauty. Although R. was condemned by Malherbe, and neglected for over 2 cents., he was rediscovered by 19th-cent. critics, and is now hailed as the greatest poet of the Re-

naissance in France. Fr. poetry owes R. a great debt: he anticipated classical art, and was one of the first masters of lyrical poetry. See G. Wyndham, *Ronsard and the Pléiade*, 1906; H. Raymond, *L'influence de Ronsard sur la poésie française*, 1927; J. Vianey, *Les odes de Ronsard*, 1932; P. Champion, *Ronsard et son temps*, 1925; D. B. Wyndham Lewis, *Ronsard*, 1944.

Ronse (Fr. Renaix), tn in the prov. of E. Flanders, 23 m. SSW. of Ghent. It manufs. cotton and woollen goods, silk, thread, hats, and shoes. The church of St Hermes dates from the 11th cent., and its crypt is one of the most interesting in the country. Pop. 25,400.

Röntgen, Wilhelm Konrad von (1845-1923), Ger. physicist, b. Lennep. He studied at Zürich Univ. and elsewhere, and held chairs successively at the univs. of Hohenheim, Strasbourg, Giessen, and Würzburg. In 1895 he discovered the famous R. or X-rays (q.v.), with which his name will always be associated. This discovery revolutionised physics and modern medicine. In 1896 he was awarded the Rumford Medal, jointly with Lenard. He became prof. of experimental physics at Munich in 1899, and received the Nobel prize for his discovery of X-rays in 1901. R. pub. many papers on these, and other subjects, and did research connected with the electromagnetic rotation of polarised light, the ratio of the specific heats of gases, conduction of heat through crystals, etc. See study by L. Zehnder, 1933.

Röntgen Rays, see X-RAYS.

Rood, see METROLOGY.

Rood (O.E. *rōd*), cross or crucifix, generally with the figures of the Virgin and St John standing on either side, placed in Eng. churches at the entrance to the chancel and over a screen known as the R.-screen. Most R.s and many screens were destroyed or defaced at the Reformation. In some Anglican churches modern R.s have been erected. A modern R. hangs in Westminster Cathedral. See also SCREEN.

Roopepoort, tn of the Transvaal, S. Africa, 12 m. NW. of Johannesburg. A municipality, and centre of the Witwatersrand goldfields, it has increased greatly in size and importance since 1930. Pop.: (whites) 29,443; (Bantu) 46,429; (coloureds) 1671; (Asiaties) 753.

Roof, top covering of any building, designed for shelter from the sun, rain, etc., and for protection. R.s are usually inclined, and slope downwards in each direction from a central ridge, but some R.s are flat, or rather have only a small fall to let the water run off. These flat R.s are usually covered with sheet lead or asphalt and are constructed after the manner of floors. Inclined or pitched R.s are usually covered with slates or tiles, and are supported on rafters. In all except the smallest R.s these rafters are supported by purlins, which in turn are supported by trusses. The latter are triangulated frames made of struts and ties, and are of many types, king-

post trusses, queen-post trusses, hammer-beam trusses, etc., but these 3 types of trusses or R.s. are now nearly obsolete. The hammer-beam truss, as in Westminster Hall, is noted for its architectural quality rather than its structural efficiency. Steel is now mostly used for trusses, also reinforced concrete, though of recent years there have been developments in timber engineering and new types of timber R.s. are now being constructed. These new developments are chiefly due to the innovation of metal connectors and synthetic resin adhesives. The connectors are usually metal rings which enable strong and cheap joints to be made instead of mortise-and-tenon joints; and the new adhesives have led to the development of laminated trusses or arches which are made of a number of bent boards 'glued' together. A hipped R. has end pitches and therefore level eaves all round, whereas in a gabled R. the end walls of the building go up to meet the roof pitches, and there are only 2 slopes. A mansard R. has 2 different degrees of pitch, meeting at a curb, on each side of the ridge. One recent development is the shell R., a thin curved reinforced-concrete membrane, light in weight and capable of spanning a wide space, without intermediate support. See BUILDING; DOME; BARGE BOARD; GABLE; GAM-BREL; HAMMER-BEAM ROOF; LANTERN; and VAULT.

Rook (*Corvus frugilegus*), gregarious bird of the crow family which generally builds its rookeries near houses. The nest is a large structure, made with great labour, of twigs and straw, and in it are laid 4 or 5 bluish-green eggs blotched with greenish-brown. The adult male is about 18 in. long, and the plumage is black with a purple gloss. The legs, toes, and claws are black. After the second moult the feathers round the base of the beak do not grow again, leaving the characteristic white patch in both sexes. R.s. are active friends of the farmer in that they destroy vast numbers of noxious insects, and the mischief they do is probably more than compensated by this service.

Rooke, Sir George (1650-1709), sailor, b. near Canterbury. He saw service against the Dutch, and was promoted to rear-adm. and commanded the squadron sent to relieve Londonderry. In 1690 he was engaged in the unfortunate action off Beachy Head. In 1692 he took part in the battle of La Hogue (q.v.) and led the night attack which led to the burning of 13 Fr. ships. In 1693 he successfully resisted an attack on his convoy by the French. In 1702, with the rank of vice-adm., he was in command of the expedition which captured or destroyed the Sp. treasure-ships and Fr. warships in Vigo Bay. In 1704, with Sir Cloudesley Shovel, he captured Gibraltar and successfully beat off an attack by the French off Málaga.

Roon, Albrecht Theodor Emil, Count von (1803-79), Ger. soldier, b. Pleushagen, near Kolberg. He was commander of the

14th Div. (1858), minister of war (1859), and minister of marine (1861-71). He was one of the military organisers in the war with Austria (1866) and the effectiveness of the Prussian Army in the Franco-Prussian war (1870-71) was largely due to him. He became F.-M. and president of the Cabinet in 1873, but resigned in the same year. He wrote *Anfangsgründe der Erd-Völker und Staatenkunde*, 1834. See lives by his son, 1895, and R. Hübner, 1933.

Roorkee, see RUMKI.

Roozendaal, industrial tn in the prov. of N. Brabant, Netherlands, 14 m. WSW. of Breda. It is the Dutch frontier station on the Paris-Amsterdam Line. Pop. 34,754.

Roozes, Max (1839-1914), a Belgian art critic, b. Antwerp. In 1877 he was appointed conservator of the Musée Plantin-Moretus in Antwerp, and later a member of the Rubens commission. He published *Titres et Portraits Gravés d'après Rubens*, 1877, *Geschiedenis der Antwerpsche schilderschool*, 1877-80, *Christophe Plantin, le Typographe Anversois*, 1882, *P. P. Rubens en Balthasar Moretus*, 1884, *L'Œuvre de P. P. Rubens*, 1890, and *Correspondance de Rubens*.

Roosevelt, Anna Eleanor (1884-). Amer. politician, sociologist, and writer, b. New York, the daughter of Elliot R. and niece of Theodore R. (q.v.). She was educ. privately. In 1905 she married Franklin Delano R. (q.v.), a distant cousin. After his election to the presidency she became well known as a writer on current topics and as a public speaker, gaining popularity by her sympathetic, energetic personality and sincere persuasiveness. As a journalist she became famous for her column, 'My Day.' She was one of the U.S. delegates to the first United Nations Assembly in London in 1946, and in Dec. of that year she was nominated to the United Nations Commission on Human Rights, on which she served until Jan. 1953. She became chairman of this commission, which, in June 1948, adopted a declaration setting out a common standard of human rights. After her husband's death she continued to have great influence in the Democratic Party. Her pubs. include *This Is My Story*, 1937, and *This I Remember*, 1949, both autobiographical.

Roosevelt, Franklin Delano (1882-1945), Amer. statesman and president, b. Hyde Park, Dutchess co., New York, only son of James R., business man and country gentleman, and of Sara Delano, member of a Fr. family which left Leyden in the 17th cent. President Theodore R. (q.v.) was a distant cousin. R. was educ. at Groton and Harvard; he graduated in 1904. He studied law at Columbia Univ., and while there married Eleanor R. (q.v.). He was admitted to the New York Bar, 1907. In 1910, and again in 1912, R. was elected to the New York Senate on the Democratic ticket. Daniels, secretary of navy, invited him to take the post of navy assistant secretary, and in that capacity R. did much to increase the

efficiency of the fleet. The Democratic Convention of 1920, which nominated Governor Cox to succeed Wilson, agreed that R. should be nominated for the vice-presidency, but his party was defeated and he returned to legal practice. In 1921 he was struck down by infantile paralysis. This might well have ended his career, but he bore the pain and deprivation with rare courage and gradually conquered both the disease and the physical incapacity it entailed. By virtue of his iron will and powers of resistance, he played a prominent part in the Democratic Convention of 1924 as a supporter of Alfred Smith. In 1928 he succeeded Smith as governor of New York State, an important office which raised him to presidential status, and was re-elected in 1930 by the highest majority ever given to a candidate for governorship. By the end of the second period of office in New York he had greatly enhanced his reputation by the just and fearless performance of his duties in the investigation of municipal affairs.



*United States Information Service:
American Embassy*

FRANKLIN D. ROOSEVELT

In the midst of the economic depression of 1932 the Republicans put forward Hoover (q.v.) for the presidential election of that year. At the Democratic Convention R. was nominated. As the campaign proceeded R.'s inspired nomination pledge of 'a new deal for the American people' seized the popular imagination.

R. received 22,821,857 popular votes and 472 of 531 in the electoral college. Before his inauguration, while in Florida, an attempt was made on his life by a madman, and his companion, the mayor of Chicago, was killed.

R.'s inauguration speech was brief and announced immediate and drastic action. He soon convened Congress and, with his great Democratic support in both Houses, was able to pass through a vast programme of reform. His plans for national recovery covered the whole range of industry. There were complaints from business and other interests which felt themselves prejudiced by the 'New Deal' legislation (for full details, see NEW DEAL), but the President's proposals were carried through on a broad wave of popular support. Eventually there came a legal check, for the 'codes' which his National Recovery Act of 1933 had imposed upon employers were adjudged unconstitutional by the Supreme Court and therefore invalid; and his Agricultural Adjustment Act met the same fate.

War debts and disarmament posed serious problems of foreign policy. Following a visit by Ramsay MacDonald in April 1933 to discuss the world situation, R. issued a message to the states concerned in the disarmament and economic conferences, suggesting a definite non-aggression pact. But this tentative approach to Amer. participation in international conferences came to nothing, and the world economic conference (q.v.) of 1934 broke down on the problem of the stability of international exchange.

By 1935 R. could claim that his basic programme was substantially completed. He entered on the presidential campaign of 1936 against Alfred Landon full of confidence. The electorate returned him with a popular vote of 27,476,678, and only Maine and Vermont were against him in the electoral college. It was a victory beyond all precedent. At the opening of his second term he put forward proposals for a reorganisation of the executive so as to increase the effectiveness of the office of president. But he had to shelve his scheme for electing an additional judge to the recalcitrant Supreme Court, his critics asserting that he was tampering with the constitution. On foreign affairs he sounded a warning note on world lawlessness. R. took what steps he could to reinforce the cause of peace, such as by extending his policy of the 'good neighbour' in relation to the Lat. states of S. America—with gratifying results. On his visit in 1938 to open the new international bridge over the St Lawrence he assured the Canadian people that the people of the U.S.A. would not stand idly by if Canadian soil were threatened by any other empire. In the same year he began more fully to exercise his influence in European affairs, sending appeals to Hitler during the Czech crisis (see CZECHOSLOVAKIA), urging the maintenance of peace, and helping to bring about the Munich Conference.

though he had no illusions about the sinister character of Axis policies. At the beginning of 1939 he told Congress that he would take any step short of war to stop aggression, and his speeches at this period, while containing strong declarations of peace, contained yet stronger vindications of democracy. As late as 1 Sept. he begged the powers concerned to declare publicly that they would not bomb civilian peoples or unfortified cities. After this there was no course open to him but to declare America's neutrality (*see* NEUTRALITY ACT); but later the ban on armaments was relaxed under the 'cash and carry' plan. With the fall of France, however, the attitude of America began to change and demands for a large programme of national defence were made. R. announced that there could be peace for America only if they were 'prepared to meet force with force if the challenge is ever made.'

It was in Jan. 1941 that he defined the 'four freedoms' (q.v.) as the aims to be satisfied if peace were to be restored to the world. Before the presidential election of 1940 R. declined, for some time, to say whether he would break with tradition so far as to stand for a third term. Meanwhile, however, he launched an immense programme for the production of munitions; transferred 50 destroyers to Britain in return for facilities to construct naval bases in the Brit. W. Indies and Newfoundland; and took 2 leading Republicans, Knox and Stimson, into his Cabinet. He took but little part in the election campaign against his opponent, Wendell Willkie, yet won easily, by a majority of 5,000,000 on the popular vote. He then introduced his generous lease-lend proposals, embodied in an 'Act to promote the Defense of the United States', indicating that a better-armed Britain was essential to the liberties of his own people and plainly intimating that America would be 'the arsenal of democracy', and emphasising the lesson of Woodrow Wilson that 'democracy cannot survive in isolation.' In a broadcast on 27 May 1941 he announced that all measures necessary to the delivery to Britain of supplies would be taken (*see* LEND-LEASE). Later in the year he sent Amer. troops to Iceland, and in Aug. he met Churchill at sea, the outcome of this meeting being the Atlantic Charter (q.v.). R. invited Congress to agree to a revision of the Neutrality Act, and also proved his determination to support Russia in her resistance to the Axis by a credit of \$100m. On 7 Dec. came the Jap. attack on Pearl Harbour. On the following day he gave, in person, a message to Congress, calling for a declaration of war. Except for 1 member the answer was unanimous, and a few days later Congress accepted the challenge of the other 2 Axis nations.

R. now entered upon his career of war leader. As commander-in-chief it was R.'s task to make an isolationist people strategically minded and to interpret the conflict, not merely as an occasion to

punish Japan, but as a world conflict, and this he accomplished despite criticisms from some sections of the press and the public. In April 1942 he proposed a 7-point programme to resist the rise in the cost of living and a large increase in taxation. The fear of inflation was always with him, the more so as Congress was somewhat reluctant to incur unpopularity by supporting R.'s drastic measures. By the summer he could validly say that America's reservoir of resources was almost at a flood stage and that huge quantities of supplies were being transported overseas for the assistance of the Allies. In Nov. 1942 came the landing in N. Africa. Shortly after his New Year Address in 1943 to Congress came his first budget for \$100 billion, a measure of the nation's prodigious war effort. Soon afterwards R. was at Casablanca, with Churchill and Fighting Fr. representatives and a host of military and naval experts, at what he styled 'the unconditional surrender meeting' in which every aspect of the war was considered. This was the first time an Amer. president had left his country in time of war. He also visited Brazil and Mexico on his way back to the U.S.A. In America he was faced with labour troubles, particularly in the mines. An Anti-Strike Bill which he vetoed was passed despite his veto, and he had other set-backs in domestic policy. Earlier in the year he had invited Churchill to Washington, when full agreement was reached on all points 'from Great Britain to New Britain and beyond.' In Nov. he went to Cairo and, with Churchill and Chiang Kai-shek, discussed future military operations against Japan. With Churchill R. then travelled to Teheran, where he met Stalin for the first time. Early in Jan. 1944 he and Mrs R. presented their homestead at Hyde Park to the U.S. Gov. as a historical national site. This followed upon an earlier gift of the Roosevelt Library there. In the same month he introduced his second budget for \$100 billion. By now the Legislature had become largely hostile to his social policy, particularly in relation to taxation. R.'s description of the Tax Bill, which he vetoed, as relief 'not for the needy but for the greedy' was an appeal over Congress to the people. In April 1944 he had to take a rest, but on his return to the White House, apparently well, the Democratic National Committee announced that he would accept the nomination for the fourth term, though R. himself declined to be drawn. In May he outlined the Amer. plan for a world security organisation, something which would be a 'new and better League of Nations' in the post-war world. On 20 July the Democratic Convention nominated him for president, following his announcement on 11 July that he would serve if elected. In the same month he was in Honolulu and also visited the Aleutians and Alaska. In Sept. he went to Quebec to meet Churchill. He made only 1 political speech in this presidential campaign.

The result was once again a decisive victory for R., and in both Houses of Congress he had safe majorities.

Early in 1945 his message on the state of the union was read to a joint session of Congress. It was a masterly and far-ranging review of the military situation. His brief fourth inaugural address, on 20 Jan. 1945, was the first war-time presidential message since the time of Abraham Lincoln. In Feb. he was at Yalta in the Crimea, where, with Churchill and Stalin, complete agreement was reached for joint military operations in the closing phase of the war against Germany. He had accepted joint responsibility with Britain and Russia for the solution of the political problems in Europe. He now looked forward to participation in the San Francisco Conference, but, while final arrangements were being made, he died suddenly at Warm Springs.

R.'s place in hist. in relation to the greatest of other Amer. presidents has yet to be assessed, but the fact that he was 4 times decisively elected is one important factor to be noted. The 2 great and protracted crises in Amer. hist. through which he piloted the nation must have involved a searching test of character and consummate statecraft, and in both crises he retained the confidence of the great majority of his fellow countrymen. His triumph over the great economic depression of the 1930's would in itself have assured his fame in the roll of Amer. presidents. But though the aims of his liberal policy required an era of peace, he revealed equally remarkable gifts in the calamity of war. With all his personal hatred of Axis tyranny, he knew well that his foresight must not lead him to act too far ahead of public opinion, nor indeed was the nation fully united behind his war policy until the awakening of Pearl Harbour. From that time, free from the restrictions that had hampered his course, he quickly became not merely the commander-in-chief in war, but a national war leader and an inspiration to the world of democracy. In council with other great war leaders overseas he enjoyed all the prestige due to his personality and to the fact that a nation stood firmly behind him. A man of R.'s stature was bound to arouse violent animosity as well as deep affection. Though as war leader he led a united America, his domestic policy was always bitterly opposed by certain sections. Some of his measures aroused, among the opposition, a bitter personal hatred. Slurs continued to be cast on his memory after his death. He was accused of vanity, extravagance, and ruthless ambition. Memoirs pub. since his death have not generally confirmed the impression of paramount greatness which R. seemed to possess during his lifetime. It is clear, for example, in his foreign policy during the Second World War, that R. placed far too simple a trust in the good faith of the Russian leaders and seems to have been unfairly suspicious of the motives of the W. European nations, in particular France

and Britain, whom he tended to regard as tainted by 19th-cent. imperialism. Some critics have accused him of, in effect, handing over E. Europe to Communism. Final judgment may decide that R.'s greatness lay in his courageous solutions of difficult situations, and in his capacity skillfully to guide and interpret the will of a great complex nation, which transformed the isolationist tradition of the U.S.A. in foreign affairs into a realisation of the nation's international obligations and its intimate concern with the fortunes of all other nations. After the war the Brit. Parliament passed the Roosevelt Memorial Act, empowering the gov. to maintain in perpetuity a statue of President Roosevelt and its site in Grosvenor Square, London. The memorial was unveiled by Mrs R. in the presence of the king and queen on 12 April 1948, the third anniversary of the President's death. It is the work of the sculptor Sir Wm Reid Dick, R.A. See also *LEND-LEASE*; *NEW DEAL*; *WORLD WAR, SECOND*, etc. See lives by Frances Perkins, 1946, and R. H. Klerman, 1948. See also B. Rauch, *History of the New Deal, 1944*; *Nothing to Fear: Selected Addresses of Franklin Delano Roosevelt* (ed. by B. D. Zevin), 1947; D. Webster, *Age of the Great Depression, 1948*; R. E. Sherwood, *The White House Papers of Harry L. Hopkins* (vol. 1), 1948; E. R. Stettinius, *Roosevelt and the Russians, 1948*; Winston S. Churchill, *The Second World War* (6 vols.), 1948-54; and C. Wilmot, *The Struggle For Europe, 1952*.

Roosevelt, Theodore (1858-1919), 25th president of U.S., b. 27 Oct., New York city, descendant of an old Dutch family which had settled in what is now New York State in 1649. His father had been collector of the port of New York. He graduated from Harvard in 1880. He then studied law, but was attracted to politics, and was elected to the New York State Legislature in 1881. In 1889 President Harrison made him a member of the U.S. Civil Service Commission, and in 1895 he was police commissioner of New York city. In 1897 President McKinley named him assistant secretary of the navy. R. was strongly in favour of war with Spain, and did much to put the navy in a state of preparedness. After war was declared, R., with his friend Dr Leonard Wood, then a surgeon in the U.S. Army, raised the volunteer regiment which became famous as the Rough Riders. R. resigned his navy post to join his regiment. In 1898 he was elected governor of New York State. Nominated vice-president on the Republican national ticket (1900), R. succeeded President McKinley on the latter's assassination (6 Sept. 1901). In 1904 he was re-elected, but did not seek a third term in 1908, when he was succeeded by W. H. Taft. R. disagreed with Taft's policy and founded the Progressive (Bull Moose) party. He stood as its presidential candidate in 1912, and, though unsuccessful, split the Republican vote by so doing and ensured the election of

Woodrow Wilson (q.v.). The biggest positive feature of R.'s presidency was the Hay-Pauncefote (q.v.) treaty, which made possible the Panama Canal scheme. In 1904 R. intervened in the Russo-Jap. war, and induced the warring countries to send delegates to Portsmouth, New Hampshire, where a peace was signed. For this he was awarded the Nobel peace prize in 1906. R. was a voluminous writer. Among his best books are *Hunting Trips of a Ranchman*, 1886; *The Rough Riders*, 1899; an autobiography,



Typical Press

THEODORE ROOSEVELT

1913; and historical books on the winning of the great West, and on the war of 1812. See lives by J. A. Rits, 1904; N. M. Butler, 1919; W. R. Thayer, 1919; and H. Pringle, 1932.

Root, Elihu (1845-1937), Amer. statesman, b. Clinton, New York, and educ. at Hamilton College. He was secretary of war in McKinley's Cabinet (1899-1904), dealing successfully with an insurrection in the Philippines. He was secretary of state under Theodore Roosevelt (1905-9), and furthered diplomatic relations with S. America and elsewhere. R. was elected as senator (Republican) for the term 1909-15, and was a peace advocate, and member of the Permanent Court of Arbitration at The Hague. He was a Nobel peace prize winner in 1912.

Root, one of the 3 distinct parts of nearly all pteridophytes (ferns and their allies) and spermatophytes (seed-bearing plants, including angiosperms), the other parts being stem and leaves. True R.s do not occur in the bryophytes (mosses and liverworts) or in the thallophytes (algae and fungi). Usually the R. penetrates into the soil, fixing the plant there and absorbing the various inorganic food materials essential to it. All that part of the plant which is underground is not

necessarily the R. A number of plants, such as mint, potato, and hop, form underground stems. A primary R. is that formed on the germination of a dicotyledonous seed by the growth of the radicle, and this may give off secondary R.s, from which a third series may arise, and so on. In some plants, especially biennials, the primary R. grows more strongly than the secondary R.s, becoming thickened into a tap R., which is conical as in the carrot, fusiform as in the radish, or napiform as in the turnip. In these plants food is stored as sugars and other carbohydrates, giving them their value as human and animal food. A fibrous R. is a much-branched system, the primary R. having been arrested in its development. Adventitious R.s are secondary R.s formed from the stems and other parts of the plant. Aerial or sub-aerial R.s are those, mostly of adventitious character, which do not grow down into the ground, but remain partially or entirely in the air; e.g. those that arise from the climbing stems of the ivy, and those formed by many tropical orchids and other epiphytes. In some instances, such as the banyan tree and mangrove tree, sub-aerial shoots are produced which ultimately penetrate into the soil. At the tip of a R. is a protective *R. cap.*; behind this is the growing region and then the region bearing the absorptive *R. hairs*.

Root, in algebra, quantity from which a power is derived; r is the n th root of r^n ; the n th root of r is represented by $\sqrt[n]{r}$ or $r^{1/n}$. The roots of an equation are those quantities which, when substituted for the unknown quantities, 'satisfy' the equation.

Root and Branch Men, extremists of the parl. party who upheld the Root and Branch Bill and Petition of 1641. This Bill provided that episcopal government, 'with all its dependencies, roots, and branches, be destroyed.' Among its adherents were Hampden, Sir H. Vane, and Cromwell.

Root Pruning of fruit trees is beneficial where they tend to make too much growth at the expense of fruit production. A trench is opened in the soil 2 or 3 ft wide half-way round the tree. Fibrous roots that cross the trench are left untouched, but roots more than $\frac{1}{2}$ in. thick are cut through with a saw and dressed with gas tar. If the soil is poor it can be enriched with ash and well-rotted manure when the trench is filled up. The following year the other half of the roots is similarly treated. The best period for the operation is between Oct. and Feb., the earlier the better.

Root Tubercles, or Nodules, colonies of bacteria which live in partnership (*symbiosis*) with leguminous plants, receiving from them sugar which they oxidize to effect the combination of free nitrogen, returning to the plants nitrogen compounds. Hence the practice of ploughing in clover, etc. to enrich the ground with combined nitrogen. This practice is very old, having been mentioned by Virgil in

his *Georgics*. The bacteria in question are *Rhizobium*; they are motile and rod-shaped.

Rope and Rope-making. Rope is a term applied to the larger varieties of twisted fibre, usually those 1 in. or more in circumference. The general term for fibre-made hauling or lashing material is 'cordage'; 'thread' is composed of 2 or 3 twisted yarns, 'twine' is made of a dozen yarns or so, 'cord' is made of 3 or more strands, each consisting of a few yarns, 'rope' is made of strands containing a large number of yarns. 'String' comes under the general heading of cord and twine, and is known in the trade as 'packing cord' or 'packing twine.' The general method of manuf. is the same in all cases: the yarns are twisted together so that the tenacity of the whole may be increased by the friction engendered; the strands are then twisted around each other in the opposite direction to the twist of the yarns. A 'hawser-laid' rope consists of 3 strands: a 'cable' or 'cable-laid' rope is composed of 3 such hawsers twisted together. A 'shroud-laid' rope consists of a central strand with 3 or 4 strands twisted around it. Cordage is sometimes plaited to secure greater pliability, as in fishing-lines, window cord, clock cords, and the most modern types of driving ropes. Many different fibres are used in rope-making. Jute, on account of its cheapness, is used for twines and cords, and, mixed with other fibres, for various qualities of rope; in general, its tenacity and durability are not sufficient to fit it for the best qualities of rope. Common hemp is the most widely used fibre, but Manila hemp, which is tenacious but somewhat stiff, sisal hemp, phormium hemp, sunn hemp, etc., are also used a great deal. The prin. fibres for marine use are Manila and sisal, which have greater strength and stand up to salt water better than other fibres. Jute is never used for this purpose, as it has not sufficient strength, nor does it stand up to immersion in water. Coir fibre is used for rope-making locally, cotton ropes are employed for driving wheels, while iron and copper enter into the composition of 'ropes' and cables for rigging and for electrical purposes. The processes of rope-making may be enumerated as hackling, spinning, tarring (where necessary), forming strands, and laying the rope. The object of hackling is to separate the fibres in the tangled 'streak' and to lay them parallel to one another. The longer fibres are then spun together to form yarn. Spinning is now done by machinery, although formerly it was a manual process, requiring much skill. Tarring, which is necessary only for ropes which will become alternately wet and dry in use, is done by passing the yarns through tar heated to about 220° F. and afterwards removing the excess of tar by a squeezing machine. The yarns are wound on bobbins after being spun. The thread is passed from the bobbins through holes in a register-plate so arranged that the threads intended to form each strand

pass through holes disposed in concentric rings. From the register-plate the threads for each strand pass into a funnel whose farther diameter is that of the strand. Each group of threads is attached to a revolving hook on a machine called a 'traveller,' which moves on rails at a uniform speed away from the bobbins, so that the 3 strands are twisted at the same time. A carriage containing a 'top' is used for laying the strands together to form the rope, thus taking the place of the walking spinner. Driving ropes are usually of cotton or of plaited sisal hemp. Nylon (q.v.) ropes are now used in mountaineering, being exceptionally strong and light in weight. Nylon rope was used in the Second World War for towing gliders. Aerial ropeways are usually made of wire rope, more or less flexible, according to the system adopted. The flexibility of wire rope depends upon the number of wires to the strand, and ropes are now made of such a degree of flexibility that they can be used for most of the purposes of hempen rope. Their great advantage is their greater strength in proportion to diameter and weight. See P. J. Stopford, *Cordage and Cables*, 1925.

Rope Trick, most discussed trick that Indian jugglers or 'magicians' are said to perform. It is supposed to be performed as follows: the magician tosses one end of a coil of rope high into the air, where it stays, drops the rest of the coil on the ground, moistens his hands, climbs up the rope, and vanishes. While the onlookers are gazing upwards wondering what has become of him, the juggler unconcernedly reappears amongst them. It is said that when Houdini (or Houdini!—see CONJURING) went to India in order to compare notes and tricks with other jugglers, he could find no one who would or could perform the l. t. Indian magic, like all 'magic,' is a combination of skill, illusion, and showmanship, and sometimes hypnotism enters into it (see Jean Kennedy, *Here is India*, 1945). Also the name of a juggling feat introduced into England from America by the Davenport brothers. The performer was bound with ropes in a chair, the lights were lowered, and on their being raised he was seen at liberty, having been released by 'spiritual agency.' The trick was exposed by John Nevill Maskelyne at Cheltenham.

Roper, William (1496–1578), biographer of Sir Thomas More (q.v.), whose daughter Margaret he married in 1525. His biography, written 1535, was pub. in Paris 1626. It is remarkable for its simplicity and pathos, and also for its well-constructed Eng.

Rops, Félicien (1833–98), Belgian etcher and painter, b. Namur. His first drawings appeared in the *Crocodile*, 1855, and in the *Uylenspiegel*, which he founded in 1856. He was chiefly employed in illustrating books, but produced some water-colours. Among his macabre and original works is the series of etchings, *Sataniques, Buveuse d'Abrinthe*, 1866, and *Le Scandale*, 1876. See descriptive catalogues by E. Ramiro, 1887–8; J.-K.

Huysmans *L'Art Moderne*, 1880; life by F. Blei, 1906.

Roque, St., see ROCH. ST.

Roquefort (-Sur-Soulzon), Fr. vil. in the dept. of Aveyron, 45 m. NW. of Béziers. It has been famous since Rom. times for its cheese, which is made of ewe-milk and matured in caves in the nearby limestone cliffs. Pop. 1400.

Roraima, Mount, flat-topped mt mass belonging to the Sierra Pacaraima, at the boundary point of Brit. Guiana, Brazil, and Venezuela. It rises in terraces, with perpendicular rocky walls from 1500 to 3000 ft high, and the top is covered with irregular ridges and peaks, the highest reaching a height of 9219 ft. Numerous streams rise on the summit and make one of the highest waterfalls in the world. It was first scaled by E. F. im Thurn in 1885.

Rorke's Drift, 28 m. from Dundee, Natal, S. Africa, on the Tugela R. At R. D. a handful of Brit. troops made a stand against a Zulu army on 22 Jan. 1879.

Rorqual, see FIN-WHALES.

Rorschach, commercial tn in the canton of St. Gallen, on the SW. shore of Lake Constance. Pop. (1955) 12,100, Ger.-speaking.

Rosa, Salvador (1615-73), It. painter, b. Arenella, near Naples; he studied art under his uncle Paolo Greco, and his father-in-law, Francesco Fracanzano. In Naples Lanfranco bought his 'Hagar,' and so started him on a career of success and prosperity. He is said to have joined in Masaniello's abortive insurrection (1647). At Rome he sang and acted in the Carnival (1639), and here he painted the great 'Battlepiece' for Louis XIV and the famous 'Saul and the Witch of Endor' (Louvre). His trenchant satires, including *Babylon*, which was obviously directed against Rome, were penned in Florence, where he lived from 1647 to 1652, secure from the terrors of the Inquisition, with which he was threatened for his *Wheel of Fortune*. His great achievement was a type of rugged and picturesque landscape, peopled with brigand-like figures and inspired by Southern Italy. See life by B. Cattaneo, 1929.

Rosa, Monte, the highest mt in Switzerland, the chief peak, the Dufourpizze, being 15,217 ft, and a second peak, the Nordend, 15,132 ft in height. A third peak, Punta Marguerita, is in Italy, and was once the site of an observatory. Ascent on the Swiss side is from the Bête temple hut and on the It. from Macugnaga. It is situated on the frontier between the canton of Valais, Switzerland, and the It. provs. of Novara and Turin.

Rosacea, see ACNE.

Rosaceae. Ninety genera and about 3000 species make up this family of trees, shrubs, and herbs, among the fruits of which are apple, pear, plum, cherry, apricot, peach, strawberry, and raspberry, while many bear flowers of great beauty and fragrance.

Rosamond, Fair, see OLIVIFFORD.

Rosamund, see ALBION.

Rosaniline (*tri-aminotolylidiphenyl carbino*l, $C_{20}H_{16}N_3O$), organic base forming salts of value in dyeing. The term R. is in commerce applied to the chloride, fuchsin, or magenta, which possesses a brilliant red colour, although the R. base is colourless. The chloride is formed by adding hydrochloric acid and nitrobenzene to a mixture of aniline, *ortho*-toluidine, and *para*-toluidine; the whole is heated to 190° C., small quantities of iron filings being added during the process. R. dyes silk, wool, and tanned cotton a brilliant red, but the colour is not very fast, so R. is generally employed as an intermediate in the manuf. of faster dyes, such as aniline blue. See DYE.

Rosapenna, seaside resort of co. Donegal, Rep. of Ireland, with a championship golf course and excellent bathing beaches. Tranarossan Bay is 3 m. distant.

Rosario: 1. City and riv. port on the Paraná, 175 m. by rail NW. of Buenos Aires in the prov. of Santa Fé, Argentina. By riv. the distance from Buenos Aires is 203 nautical m. There is a cathedral and a univ. R. is primarily a centre for the transport overseas of the agric. produce of the central and N. provs. The staple export is wheat, and after that flour, sugar, linseed, and cattle. The quays and wharves are used by ocean steamers up to 10,000 tons and by riv. boats, and there are excellent railroad facilities. R. has made great strides since 1854, and is now the second city in Argentina. It has large sugar refineries, and also grain elevators, flour-mills, saw-mills, furniture factories, packing works, tanneries, brickyards, tobacco factories, and printing works. The streets are wider than many in Buenos Aires, and there are sev. imposing boulevards and fine open spaces. A concrete paved road, on the route to Córdoba, joins R. to Buenos Aires via Pergamino. Pop. 761,300.

2. Tn. of Uruguay, in the dept. of Colonia, 110 m. by rail from Montevideo and 30 m. from Colonia. Its products of wheat, maize, and dairy produce are shipped from the port of Juan Lacaze. Pop. 8500.

Rosary. The prayers of the R. proper include 15 *Our Fathers* and 150 *Hail Marys* divided into decades, or tens, each *Our Father* preceding a decade of *Hail Marys*. The beads most commonly in use constitute a chaplet, or a third of a R.—5 *Our Fathers* and 5 decades of *Hail Marys*; to these are customarily added 5 *Glory be to the Fathers*, 1 after each decade of *Hail Marys*. The chaplet signifies only 1 of 3 sets of mysteries—the 5 joyful, 5 sorrowful and 5 glorious mysteries which form the subjects of 15 meditations while each decade of prayers is said. The power of the R. has been preached by St. Dominic, St. Francis de Sales, and countless saints and popes down to our own day, and was the keynote of the miracles at Lourdes and Fatima. Always a

popular devotion, its use as a daily family prayer has been propagated far and wide during the last few years by Fr. Patrick J. Peyton: see his book *The Ear of God* (New York, 1951).

Rosas, Juan Manuel (1793-1877), Argentine statesman, b. Buenos Aires. He trained an effective fighting force on his cattle run at Los Cerrillos, and, by effectually employing it in political strife, at last became tyrant of Buenos Aires. He was dictator from 1835 to 1852. He failed to force the Plate R. states into the confederation which he had organised and, after he was defeated by Urquiza at Monte Caseros, he took refuge in Southampton (England), where he died. He had ruled with exceptional ruthlessness and cruelty.

Roscelin, or **Roscellin**, Johannes (c. 1050-c. 1120), Fr. theologian, b. Compiègne. He played an important part in introducing Nominalism into the medieval schools. R. was a follower of Abélard. His speculations led him into conflict with the Church, and in 1092 his teachings on the Trinity were condemned by the council of Soissons. See P. Picavet, *Roscelin, philosophe et théologien*, 1911.

Roscher, Wilhelm Georg Friedrich (1817-94), Ger. economist, b. Hanover. He studied at Göttingen and put forward a most thorough and lucid exposition of the historical school of political economy. He wrote *Geschichte der Nationalökonomie in Deutschland*, 1874, *Kolonien Kolonialpolitik und Auswanderung* (3rd ed.), 1885, and a monumental *System der Volkswirtschaft* in 5 vols., 1854-94, which included the highly prized *Grundlagen der Nationalökonomie* (17th ed.), 1884. See study by N. Werner, 1938.

Rosellum, see **ROSSANO**.

Roscius, Quintus Gallus (d. c. 62 bc), Rom. comic actor, b. of slave parents at Solonium. A past-master in gesture, enunciation, and grace, he was in comedy the equal of Aescopus in tragedy. Sulla gave him a gold ring, the symbol of knightly rank, and Cicero was his devoted friend. R. was noted for the naturalism of his art.

Roscius, Young, see **BETTY, WILLIAM**.

Roscoe, Sir Henry Enfield (1833-1915), chemist, b. London, and educ. at London and Heidelberg Univs. At Heidelberg he formed a lasting friendship with Bunsen, whose associate he was in the development of comparative photochemistry. He was prof. of chem. at Owens College, Manchester, from 1857 to 1887. R. represented a Manchester constituency in Parliament from 1885 to 1895, and was vice-chancellor of London Univ. from 1896 to 1902. Besides making researches on vanadium, he was joint-author with Schorlemmer (d. 1892) of a standard treatise on chem. (1877-84). R. was knighted in 1884. He pub. an autobiography in 1906.

Roscoe, William (1753-1831), historian, b. Liverpool. He practised for some years as an attorney, but in 1774 abandoned the profession of law for that of literature. His prin. works were *The Life of Lorenzo*

de' Medici, 1795, and *The Life and Posthumous of Leo the Tenth*, 1805, both of which achieved remarkable success. He also wrote the nursery classic *The Butterfly's Ball and the Grasshopper's Feast* (*Gentleman's Magazine*, Nov. 1806), which inspired Beau Brummell to write *The Butterfly's Funeral*. See life by Henry Roscoe, 1833.

Roseoff, fishing vil. of Brittany, France, in the dept of Finistère. It has a zoological laboratory, and is also a seaside resort. The church of Notre-Dame-de-Croaz-Baz (1550) has an unusual tower, like a minaret. There is a ruined chapel to St Ninian (1573) built by Mary Queen of Scots in commemoration of her landing at R. Pop. (com.) 4200.

Rosecommon, Wentworth Dillon, 4th Earl of (1633-85), poet, b. Ireland. Educ. as a Protestant, he studied at Caen Univ. and travelled on the Continent. He enjoyed a considerable literary reputation in his own day on the strength of a poetical *Essay on Translated Verse*, 1684, and translations from Horace's *Art of Poetry*. He was the first critic to praise *Paradise Lost* publicly. See life by O. Niemeyer, 1934.

Rosecommon, inland co. of Rep. of Ireland, in the prov. of Connaught, bounded on the N. by Sligo, S. by Galway, E. by Longford and Westmeath, and W. by Mayo and Galway. It was estab. as a co. about 1580. It is 60 m. long and 37 m. broad, with an area of 990 sq. m. and a pop. of 68,102 (1954). There are some extensive bogs and numerous lakes, Loughs Boderg, Allen, and Ree being the largest. Agriculture is the leading industry. R., the cap., is a mkt. tn, 92 m. W. by N. of Dublin. At Castle Strange is a sculptured standing stone of the Early Iron Age. R. contains the remains of a Dominican priory and a castle dating from the 13th cent. Pop. of tn 2000. Other important tns are Castlerea, Elphin, and Boyle.

Rosecommon Breed, see **SHEEP**.

Roscrea, mkt. tn of co. Tipperary, Rep. of Ireland, 32 m. N. of Cashel. In the 7th cent. St Cronan founded an abbey at R. It contains the ruins of sev. churches and castles, besides a round tower and an anct. cross. There is a large modern Trappist monastery, with a school and agric. college attached. Industries include meat products, bacon, and chemicals. Pop. 3000.

Rose, Hugh Henry, see **STRATHNAIRN, BARON**.

Rose, John Holland (1855-1942), historian, b. Bedford and educ. at Owens College, Manchester, and at Christ's College, Cambridge. He became first Vere Harmsworth prof. of naval hist. at Cambridge in 1919, and was a leading authority on Brit. hist. of the Napoleonic period. His pubns., of which sev. have become standard works, include *Life of Napoleon I*, 1902, and *William Pitt and the National Revival*, 1911. He bequeathed a sum to Christ's College for the endowment of a scholarship to encourage the study of recent Brit. imperial hist.

Rose (*Rosa*), large genus of flowering plants in the family Rosaceae, unsurpassed for the beauty and fragrance of their blooms. In the culture of the numerous species and almost countless varieties for the sale of plants, the production of cut blooms, and the manufacture of R.s and other perfumes, many thousands of people are employed. There are 10-15 Brit. species, which hybridise with one another somewhat freely; the best known are the Dog R. (*R. canina*) and the very fragrant Sweet Briar (*R. eglanteria*). Among the numerous cultivated species are *Banksiae*, the white or yellow Banksian R., valuable for walls; *bracteata*, the dwarf white-flowered Macartney R.; *centifolia*, the Cabbage R., with its many fine varieties, including the Moss R.; *damascena*, the Damask R.; *indica*, the China or Monthly R.; *foetida*, the Austrian briar; *moschata*, the Musk R.; *multiflora*, or *polyantha*, a group of valuable climbing R.s; *rugosa*, the Jap. R.; *sempervirens*, the Evergreen R.; and *Wichuratanana*, another group of beautiful climbers. The latest development is the new race of R.s known as the Floribunda, a cross between the Polyantha Pompon and the Hybrid Tea. This race is remarkable for its vigour and free flowering habit. R.s can be planted from Nov. to Mar., the earlier the better; they do best in a heavy loam or friable clay, the roots being spread out and covered with a few inches of fine soil, the hole being filled with ordinary soil well trodden in. Hard pruning in the spring after planting is advisable, and afterwards pruning is regulated by the amount of ann. growth.



TYPICAL RUSH-ROSE
Rose acicularis, Lindley.

There are numerous methods of propagating R.s: budding is the most frequently practised. Cuttings are easily struck in Sept., and many kinds can be increased by layering. Grafting and seed raising are methods more commonly practised by the R. breeder. See J. H. Pemberton, *Roses, their History, Development, and*

Cultivation, 1908; G. M. Taylor, *Roses, their Culture and Management*, 1945; S. C. Bradford, *The Romance of Roses* (3rd ed.), 1947; pubs of the National Rose Society, London, S.W.1, issued to members, which deal with the various phases of R. growing. This, the largest specialist society of its kind in the world, the membership of which now totals 23,000, has as its object: 'To encourage, improve, and extend the cultivation of the Rose by means of publications, exhibitions, and other activities.'

See also BRIAR; ROSE HIPS; GARDENING.

Rose, in heraldry, charge appearing at an early period of heraldry (e.g. for the Lords Darcy, 13th cent). Although often described as 'conventional,' the heraldic R. is an exact reproduction of the wild rose of the hedgerows, i.e. with 5 petals displayed. Under Henry VII it began to be shown with a double layer of petals, and in the later Tudor period was often blazoned as 'slipped and leaved' (with stalk and at least 2 leaves). When blazoned as 'proper' the R. is Gules with the centre seeds Or and the calyx Vert.

'Rose, Roman de la,' see LORRIS, GUILLAUME DE, and MEUNG, JEAN DE.

Rose Acacia, see ROBINIA.

Rose Apple (*Eugenia jambos*), Malayan evergreen tree of the Myrtaceae family. It grows between 20 and 30 ft high, has oval, leathery leaves, and clusters of small, 4-petalled, white flowers. The fruits are yellowish-white fragrant drupes, used in confectionery.

Rose Beetle, or Green Chafer (*Celonia aurata*), brilliant copper-green beetle, with pale creamy marks on the wing cases. It eats the petals and foliage of roses and other plants, and the grubs or larvae attack the roots. The beetles appear in May and deposit their eggs in the ground. The white grubs resemble those of the cockchafer, and they pupate in earthen cells. When they are present in numbers the soil about the roots should be examined for grubs.

Rose-coloured Starling, see PASTOR.

Rose Hips, fruit of the briar, wild dog rose, and cultivated garden roses, are a rich source of vitamin C, i.e. the most valuable being the large berries of *Rosa mollis*. For home consumption the berries are best left on the bushes until after the first frost has softened them. Care should be taken in handling, and they should be kept from extremes of temp. and air, and away from metal. The hips should be washed, and may be made into a puree by cooking in water in a covered pan, sieving, adding sugar, re-boiling and sealing in jars: the puree should keep for many months. If a syrup is required the puree should be diluted with water and strained through flannel. Raw fruit puree is richer in vitamins, but not so reliable for keeping. The berries should be very ripe, halved, and soaked till soft, sieved, and warm sugar well stirred in, and the puree put immediately into jars and sealed. Dried or dehydrated berries are easy to store.

They should be halved and dried, after which the hairs and pips may be easily removed. When required for use they should be soaked for 2-4 days, rubbed through a sieve, and sugar added. *See* (Claire Loewenfeld, *Britain's Wild Larder* (London Health Centre, Leaflet No. 3).

Rose-mallow, *see* Hibiscus.

Rose of Jericho, or Resurrection Plant (*Anastatica hierochuntica*), small half-hardy ann. (family Cruciferae), bearing small white flowers, and sometimes grown in light garden soil. In its native deserts, after flowering the branches bend inward and dry hard and woody; the plant is blown out of the soil and rolls over the ground, shedding its seeds as it goes, which germinate freely when rains return.

Rose of Lima, St (1586-1617), patron of S. America and the Philippines, b. Lima, Peru, of Sp. descent. She lived as a Dominican tertiary in her own home, modelling her life upon that of St Catherine of Siena (q.v.). She was canonised in 1671, the first person of Amer. birth to be declared a saint. Her feast-day is on 30 Aug.

Rose of Sharon, or *Hypericum calycinum*, low shrub, with large, handsome, solitary yellow flowers, sometimes grown as a cover plant for game. *See also* SHARON.

Rose-water, water scented with the distilled essence of roses. In the E. R. is sprinkled over the hands after eating, and the custom is occasionally followed in Europe. Sev. R. dishes for this purpose exist in England, including one presented by Samuel Pepys to the Clothworkers' Company. *See* ALTAR.

Rose-water Ointment, *see* COLD CREAM.

Rose Window, in Gothic architecture, circular window frequently placed over one of the large doors. It is usually filled with elaborate tracery.

Roseau, cap. of Dominica, Windward Is., on the W. coast. From it. bananas, coco-nuts, limes, rum, etc., are exported. It is an open roadstead. Pop. 9752.

Rosebery, Archibald Philip Primrose, fifth Earl of (1847-1929), statesman, b. London, educ. at a preparatory school at Brighton and at Eton and Christ Church, Oxford. He succeeded his grandfather in the earldom, 1868, and he left Oxford in the same year without a degree. R. was a keen scholar, and was from youth a collector of books and MSS. His thoughtful speeches attracted notice, and in 1871 he was selected to second the reply to the speech from the throne; during Disraeli's last term of office he criticised Lord Salisbury and supported the cause of Greece. In 1878 he married Hannah, daughter of Baron Meyer Rothschild. The same year he was selected lord rector of Aberdeen Univ., in 1880 of Edinburgh Univ., and in 1899 of Glasgow Univ. He was under-secretary to the Home Office from 1881 to 1883. In 1885 he was in the Cabinet as lord privy seal and first commissioner of works. He was foreign secretary for 6 months in the brief Liberal administration of 1886.

In 1889, when the London Co. Council came into existence, R. became its first chairman. In 1892 he was invited by Gladstone to return to the Foreign Office, which with some reluctance he did. In Mar. 1894, after Gladstone's resignation, he accepted the premiership as first lord of the Treasury and president of the council; he resigned in June 1895, after defeat in the Commons over cordite. In 1896 R. resigned his leadership of the Liberal party, which the Radical wing had always disliked. The breach was widened by his attitude on the S. African war, when he declined to accept Campbell-Bannerman's policy. He was shocked by the Lloyd George budget of 1909, but took no definite position as to the policy of the Lords. In 1911 he received the U.K. earldom of Midlothian. It was as a maker of non-political speeches that R. charmed everybody: many such are included in his *Miscellanies: Literary and Historical*, 1921. In retirement he devoted much time to literature. He had already pub. *Pitt* in 1891, and other pub. include *Sir Robert Peel*, 1899, *Oliver Cromwell*, 1900, *Lord Randolph Churchill*, 1906, and *Chatham*, 1910. Among R.'s wide interests was the turf: he did much to raise the prestige of Eng. horse-racing, and his horses won the Derby in 1894, 1895, and 1905. This interest was among others which made him unpopular among the rank and file of his own party. His imperialist ideas always rendered him suspect, and he had not the drive essential to the effective political leader. On politics his attitude was more that of the detached observer than of the ardent partisan, and though he could speak with effect in the House of Lords, he lacked the manner to appeal to the crowd, which Gladstone had made a part of the Liberal tradition. His real brilliance is to be found in his historical and literary pub., not in his political achievements. *See* lives by E. T. Raymond, 1923; E. H. Thurston, 1928; and the Marquess of Crewe, 1931.

Rosecrans, William Starke (1819-98), Amer. soldier, b. Kingston, Ohio. Studied at U.S. Military Academy, where he became an assistant prof. Carried out some important engineering feats. As an officer during the Civil War in the Federal army he was remarkably successful, showing himself a brilliant strategist, winning battles at Juka, Corinth, and Stone River; but, defeated at Chattanooga (1863), he was superseded; reinstated in 1864, he drove Price out of Missouri. In 1868 he became minister to Mexico, in which position he proved a successful administrator. Sat as Democrat in Congress for some years.

Rosegger, Peter Kettenfeler (1843-1918), Austrian poet, b. Aipi, Styria, son of a peasant, and largely self-educated. He soon attracted notice by his poetry, which is of a romantic order, and he attained great popularity in Austria and Germany as novelist, poet, and playwright. He is at his best in novels describing peasant life, as *Die Schriften*

eines Waldschulmeisters, 1875, and *Waldheimat*, 1877. His output was enormous, and his collected works were pub. in 40 vols. (1914-16). An Eng. trans. by M. F. Kling was pub. in 1912. See lives by R. Plattensteiner, 1928; M. Schwartz, 1938; O. Janda, 1943.

Roseheart, burgh and small fishing port of Aberdeenshire, Scotland, 4½ m. from Fraserburgh. Pop. 1175.

Rosellini, Ippolito (1800-43), It. Egyptologist, b. Pisa, explored Egypt as head of Tuscan delegation in Champollion's mission to Egypt, 1828-9. On his return, R. pub. his materials in the great *Monumenti dell' Egitto et della Nubia*, 1832-40.

Rosemary, or *Rosmarinus officinalis*, labiate plant found in Britain. It is an evergreen shrub cultivated for its flowers and leaves, from which oil of R. is distilled in France and Spain. *Ledum palustre*, sometimes called the marsh R., and *Andromeda polifolia*, Wild R., both being species of Ericaceae.

Rosemead, Baron, see ROBINSON, HERCULES.

Rosen, Friedrich August (1806-37), Ger. orientalist, was prof. of languages and later of Sanskrit in University College, London. He had already pub. *Radices Linguae sanacritae*, 1827, and other works, and was working on the *Rigveda* (posthumously pub. as *Rigveda-Sankhita, liber primus, sanscrita et latine*, 1838) at the time of his premature death.

Rosenberg, Alfred (1893-1946), Ger. National Socialist, politician, and writer, b. Reval (Tallinn). He went to Munich in 1918 and was one of the first members of the National Socialist party, becoming editor of the *Völkischer Beobachter* in 1921. In books, pamphlets, and newspaper articles he built up a Nazi ideology founded on anti-Semitism and pagan Teutonic mythology and mysticism. In 1941 R. was appointed minister of occupied E. ters. He was hanged for war crimes, being a leading defendant at the Nuremberg trials. His most famous pub. was *Der Mythos des XXten Jahrhunderts*, 1930.

Rosenberg, see SUZ.

Rosenberg Case. In 1940 Julius Rosenberg and his wife Ethel, both members of the Communist party, began attempting to transmit to the U.S.S.R. military secrets which Rosenberg had obtained during his employment with the U.S. Army Signal Corps. When Mrs Rosenberg's brother, Sgt. David Greenglass, was assigned to the atomic-bomb project at Los Alamos, Rosenberg obtained top-secret data on nuclear weapons from him. This he gave to Harry Gold, who delivered it to the Soviet vice-consul. Gold was arrested by the F.B.I. in May 1950, Greenglass in June, Rosenberg in July, and Mrs Rosenberg in Aug. Greenglass, who turned State's evidence, received a 15 years' prison sentence; Gold was sentenced to 30 years in prison. The Rosenbergs were sentenced to death on 5 April 1951. After numerous appeals, they were executed on 19 June 1953.

Rosenheim, Ger. tn in the *Land* of Bavaria (q.v.), on the Inn (q.v.), 33 m. SE. by E. of Munich. It is in a picturesque Alpine dist., has a 15th-cent. church, and has medieval squares and beautiful gardens. Glass, paper, beer, and machinery are manuf. Pop. 32,000.

Rosenkranz, Karl (1805-79), Ger. philosopher, held the chair of philosophy at Königsberg from 1833 till his death. Blindness overtook him in his latter years. A steadfast Hegelian, he steered with Michelet a middle course between Erdmann and Straus. Besides his *Life of Hegel*, 1844, and his many contributions to Hegelian criticism, including *Meine Reform der Hegelischen Philosophie*, 1852, he wrote a *Handbuch einer allgemeinen Geschichte der Poesie*, 1832-3.

Rosenthal, Moriz (1862-1946), Polish pianist, b. Lwów; he studied there and in Vienna. He gave his first recital in Vienna in 1876, and between 1877 and 1880 he visited Weimar, Rome, Paris, and St Petersburg with Liszt. In the technique of piano-playing R. was unsurpassed; he excelled especially in Chopin's compositions. His own compositions are slight but often exquisite.

Roseola, term applied to any rose-coloured eruption, but often used as a synonym for *Rubella*, or Ger. measles. See under MEASLES.

Roses, Wars of the, civil wars of the 15th cent. in England when the rival houses of York and Lancaster struggled for supremacy. The name arose from the fact that the rose was selected as a badge, the adherents of York wearing white roses, those of Lancaster red. The wars commenced in the reign of Henry VI. While the king was suffering from insanity (1453-4), Richard, Duke of York, was Protector, and when on his recovery the king resumed the head of affairs the Yorkist lords demanded that he should dismiss the Lancastrian lords from his council. On his refusal they at once armed, and the first battle was fought at St Albans, 22 May 1455, resulting in a victory for the Yorkists. The king was now a prisoner; York again became Protector, but 4 years later he was dismissed, and a battle was fought at Blore Heath, 23 Sept. 1459, the Yorkists, under Salisbury, being once more victorious. But their victory was of little use to them, for when Henry VI later marched to Ludlow they were panic-stricken and fled, York escaping to Ireland, and Salisbury and Warwick to France. At a parliament held at Coventry they were attainted, and this added bitterness to the feud. In July 1460 at the battle of Northampton the king was again made prisoner. Attempts were made to bring about peace by Parliament, which decided that Henry should be allowed to reign and that York should then succeed; but the Lancastrians, influenced by Queen Margaret, declined to accept these terms, and at the battle of Wakefield, 30 Dec. 1460, both York and Salisbury were killed. The Lancastrians, with Queen Margaret at their

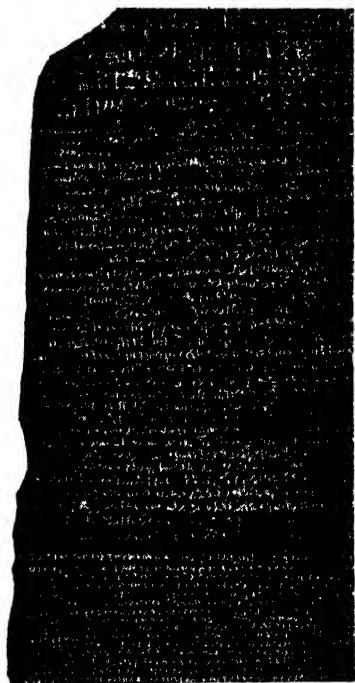
head, then marched S. and succeeded in defeating Warwick at the second battle of St Albans 17 Feb. 1461, and rescuing the king. However, York's son, Edward, Earl of March, had won the battle of Mortimer's Cross, 2 Feb. 1461, and he now joined Warwick and marched to London, where he was proclaimed king as Edward IV, following up his proclamation by a decisive victory at Towton, 29 Mar. 1461. Queen Margaret was forced to flee to France shortly afterwards, having been defeated by Warwick at Hedgeley Moor and Hexham (25 April and 8 May 1464). At Hexham Henry VI was once more captured and placed in the Tower. For the next few years peace reigned until the powerful Warwick, known as the 'king-maker,' started intriguing against Edward IV and joined forces with the Lancastrians. Warwick was, however, soon forced to flee to France, but returned, and Edward, in his turn, fled to Flanders. In 1471, however, Edward returned with an army, landed in Yorkshire, and defeated and killed Warwick at the battle of Barnet, 14 April 1471, a victory which he followed up by the defeat of Queen Margaret at Tewkesbury, 4 May 1471, capturing the queen and killing her son Edward. For some years after peace reigned, with the Yorkists supreme, but the unpopularity of Richard III gave new hope to the only surviving Lancastrian claimant, Henry Tudor, Earl of Richmond. The final struggle in the Wars of the Roses really took place at the battle of Bosworth Field, 22 Aug. 1486, which gave the crown to Henry as Henry VII, and established the throne on a firm foundation, his marriage with Elizabeth of York cementing the peace between the 2 parties. The wars were not fought on principles, but were founded on personal quarrels; the mass of the people were probably indifferent to the struggles, which seem to have affected England extraordinarily little. The period they covered marks the beginning of the Eng. Renaissance, the flowering of Perpendicular architecture, and the growth of the merchant class. But during the wars the old nobility was almost wiped out; a larger class of property owners with smaller fortunes replaced the great magnates, a sure basis on which Tudor despotism could be founded. See J. H. Ramsay, *Lancaster and York*, 1892; J. D. Thorne, *England under the Yorkists*, 1920; and J. H. Fleming, *England under the Lancastrians*, 1921.

Rosetta (Arabic *Rashia*), decayed native city on the 'Rosetta' branch of the Nile in Egypt. The famous 'Rosetta Stone' (q.v.), which led to the deciphering of Egyptian hieroglyphs, was found near here in 1799 by Bonnard. Pop. 16,000.

Rosetta Stone, inscribed slab of black basalt, which provided the key for the decipherment of hieroglyphic (q.v.) writing. It was discovered in 1799 near St Julien, 4 m. N. of Rosetta, by Bonnard, a Fr. officer. Napoleon had it deposited for study at the Fr. Institute in Cairo.

On the capitulation of Egypt to the Brit., the R. S., shipped in 1801 to England, passed into the Brit. Museum (where it is now: B.M. 960, No. 24). The R. S. is a mutilated block, about 3½ ft long, 2½ ft wide, and 1 ft thick. It is covered on its one flat surface with inscriptions in 3 different scripts.

It was immediately inferred that these inscriptions were but different forms of the same text. The upper version (14 lines) was in Egyptian language and in hieroglyphic writing; the second text (32 lines), also in Egyptian, was written in demotic (q.v.) writing; and the last



British Museum

ROSETTA STONE
(Upper left-hand corner)

In the reproduction can be seen a part of the corresponding inscriptions in hieroglyphs, demotic, and Gk.

(54 lines) was written in Gk language and script. This last text was readily interpreted, and the monument proved to be a decree drawn up on the 18th *meshir* (27 Mar.), 196 BC, by the priests of Memphis, in honour of Ptolemy (V)

Epiphanes (203-181 bc). Starting from the known, the hieroglyphic and demotic writings were slowly made to yield their secrets. The hieroglyphic text contains oval rings, known as 'cartouches,' and already in 1797 the Dan. scholar G Zoega had recognised that such 'cartouches' contain royal names. Comparing the hieroglyphic text with the Gk version the Cambridge scholar Dr Thomas Young (1773-1829) succeeded in the decipherment of a few letters in the name Ptolemy (Gk Ptolemaios). The Fr. Egyptologist Jean François Champollion (1790-1832) recalled an obelisk with a bilingual inscription he had seen on the is. of Philae in the Nile, containing similar cartouches and, in its Gk version, the names Ptolemy and Cleopatra (Ptolemaios, Kleopatra). Champollion recognised how similar were the cartouches of the obelisk and of the R. S., and that the cartouches of the obelisk, containing 2 different names, had some of the same symbols. Champollion thus found the values of 13 characters. Next he identified (on other monuments) the name 'Alexander,' which supplied 3 more signs. Step by step he went through all the proper names he could find, and at last he could read whole sentences. In 1822 Champollion announced the results of his studies to the Académie des Inscriptions at Paris. In this masterly dissertation and in his subsequent researches he laid the foundation of the modern science of Egyptology.

Rosevear, tiny uninhabited is., outermost of the Scilly Is., England, 28 m. from Land's End. Many species of seabird are found here. Bishop Rock lighthouse lies to the extreme SW. of the Scilly group.

Roseville, residential vil. in Macomb co., SE. Michigan, 13 m. NNE. of Detroit, near Lake St Clair. It has a sheet-metal plant. Pop. 15,816.

Rosewood, wood of various trees, so called on account either of a rose-like fragrance, or a rose colour. The best fragrant R., often called Palisander wood, is derived from *Dalbergia nigra*, a native of Brazil, whence it is exported in large, heavy slabs. The wood is chiefly used in veneer and cabinet work. See TIMBER.

Rosh ha-Shanah (Heb. Head of the Year, New Year), a main Jewish festival, celebrated on the first 2 days of the seventh month (*Tishri*), which was the beginning of the civil year in anct Israel. As on the Day of Atonement (q.v.), and in contrast with the other Jewish festivals, communion with God is sought not through joy, but through solemnity, R. ha-S. being an occasion for solemn introspection and meditation over the year that has gone. In the synagogue a ram's horn is blown to summon the congregation to repentance.

Rosicrucians, members of a mystical brotherhood perpetuating the teachings of the mystery schools of anct Egypt, who traditionally regard Amenhotep IV as their first Grand Master. Announcing itself publicly in the 17th cent., the *Fama*

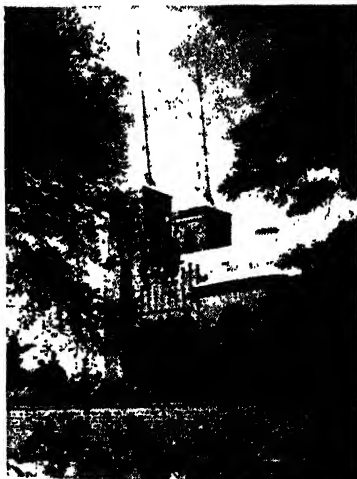
Fraternitatis allegorically attributed its origin to Christian Rowenkreuz, a Ger. nobleman of the 14th cent. This tract, mistakenly credited to others, was prepared under the direction of Francis Bacon, the fraternity's imperator in that cycle of its activity. Its emblem was a golden cross with a single red rose at its centre. The men and women of the Rosy Cross dedicated themselves to the study of God and Nature's laws.

To-day, this non-sectarian philosophic and scientific fraternity, embracing not only Great Britain, her possessions, and Europe, but also the Americas and the Far East, is known as the Ancient Mystical Order Rosae Crucis (A.M.O.R.C.), with its Supreme See in San Jose, California, U.S.A. In the words of Bacon, its aim is 'to glorify God and benefit man's estate.' See H. Spencer Lewis, *Rosicrucian Questions and Answers, with Complete History of the Order*, 1929 (5th ed., 1954).

Rosin, see COLOPHONY.

Rosin, see PAINTS; VARNISHES.

Roskilde, seaport and residential tn on the R. Fjord, ls. of Zealand, Denmark, 20 m. WSW. of Copenhagen. Until 1443 this tn was the cap. of Denmark, and its cathedral, dating from the 12th cent., contains the tombs of the Dan. kings. Pop. 28,880.



Royal Danish Embassy

ROSKILDE CATHEDRAL

Roslin, or Rosalyn, vil. on the N. Esk, 7 m. S. of Edinburgh, in Midlothian, Scotland. It was made a burgh in 1456, but later became unimportant. There are remains of the 14th-cent. castle of the

Sinclair, which the Eng. razed in 1544, but the chief glory of the vil. is the chapel, described in Scott's *Lay of the Last Minstrel*. Its proportions are small (70 ft x 35 ft x 42 ft), but the delicate and beautiful carving on the 'Prentice pillar,' on the clustered columns, pinnacles, and vaulted roof are outstanding. R. gives the title of earl to the family of St Clair Erskine. Pop. 2000.

Rosman, Alice Grant (1887-), Australian novelist, b. Kapunda, S. Australia. Educ. at the Dominican Convent, Cabra, Adelaide, she went to London in 1911 and joined the staff of the *Grand Magazine*. She first attained success as a novelist with *The Window*, 1928, which sold 100,000 copies and was followed by *Visitors to Hugo*, 1929, another success. Others of her books are *The Young and Secret*, 1930, *The Sixth Journey*, 1931, *Protecting Margot*, 1933, *Somebody Must*, 1934, *The Sleeping Child*, 1935, *Unfamiliar Faces*, 1938, and *Nine Lives*, 1941.

Rosmer, Milton (1881-), actor, b. Southport, and educ. at Manchester Grammar School. He made his first stage appearance in 1899, and from 1910 to 1915 was a leading member of Miss Horniman's company at Manchester. His London successes include performances in *St Joan*, 1924, and *Gas Light*, 1939.

Rosmini, Carlo de (1758-1827), It. biographer, b. Milan; wrote lives of Ovid, 1789, Seneca, 1793, Vittorino da Feltre, 1801, Filastro, 1808, and Trivulzio, 1815, and also a *Storia di Milano*, 1820, as far as 1535.

Rosmini-Serbati, Antonio (1797-1855), It. philosopher and theologian, b. Rovereto and ordained 1821. He founded in 1828 the Institute of Charity, the prin. house of which in England is at Ratcliff College, near Leicester. Encouraged by Leo XII and successive Popes, he undertook the reform of philosophy, but his works provoked much opposition. Two of his books, *The Five Wounds of Christ* and *The Constitution of Social Justice*, were placed on the Index for certain views concerning the election of bishops. In 1888, after his death, 40 propositions mainly from unrevised posthumous works, were condemned. See T. Davidson, *The Philosophical System of Antonio Rosmini-Serbati*, 1882.

Rosolic Acid ($C_{10}H_7O_5$), coloured organic compound formed from the rosaniline base by treating it with nitrous acid and heating; the product, trihydroxytolylidiphenyl carbinol, is unstable and loses 1 molecule of water to form R. A. In commerce it is prepared by heating phenol with oxalic acid and sulphuric acid. R. A. possesses a beautiful red colour, but is not much used in dyeing, as it is difficult to fix. It is employed as an indicator for acids and alkalis, as acids decolorise it.

Ross, Betsy (1752-1836), semi-legendary figure in the early hist. of the U.S.A., b. Philadelphia. She is said to have made a Stars and Stripes flag from a pencil sketch by Washington as early as June

1776, but she changed the points of the stars from 6 to 5. Historians doubt the story's accuracy.

Ross, Earldom of, Fearchar Mac an t'sagart was created Earl of R. in 1225 by Alexander II, King of Scotland. Both he and his descendants were prominent in the public life of their times. The third earl, Hugh, was killed in 1333 at the battle of Halidon Hill. His granddaughter, Eupheme, succeeded her father, Earl Wm. in 1372. She married Sir Walter Leslie of Aberdeen, a distinguished soldier, and on her death (c. 1395) the title passed to her son, Sir Alexander Leslie. He d. in 1402, and his daughter heiress, Eupheme, d. without issue (c. 1415). Thereupon her aunt Mary, wife of Donald Macdonald, Lord of the Isles, succeeded. The earldom remained with the Macdonalds until 1476. In that year the thirteenth earl, John, having been convicted of treason, and having made his submission in Parliament, was created a peer of Parliament as Lord of the Isles. The earldom of R., however, was not restored. It was annexed by the crown, not again to be granted to any but the only or second legitimate son of the Scottish king.

Ross, Sir Edward Denison (1871-1940), Brit. orientalist, educ. at Marlborough School and Univ. College, London, and studied oriental languages in Paris and Strasburg. In 1908 he was curator of records for the gov. of India. From 1914 to 1917 he was assistant in the Art of the E. section of the prints and drawing dept of the Brit. Museum. In 1917 he was appointed the first director of the School of Oriental Studies (q.v.) and, at the same time, prof. of Persian in the univ. of London, holding both offices until his retirement in 1937. Among his varied subs. were *The Heart of Asia* (with F. H. J. Krine), a popular account of Persian art, trans. of an Arabic hist. of Gujarat, a polyglot list of birds in Turki, Chinese, and Manchu, and *The English Language*, 1939.

Ross, Sir James Clark (1800-62), sailor and explorer, b. London. He made altogether 5 voyages in search of the NW. passage, and accompanied Parry in his effort to reach the N. Pole (1827). Whilst with his uncle, Capt. John R., he discovered the N. magnetic pole (1831). In his *Voyage of Discovery and Research to S. and Antarctic Regions*, 1847, he gives the results of his own experiences in the *Erebus* (1839-43). He was knighted in 1843. He named Mt Erebus and Victoria Land (Antarctica), and the Ross Sea bears his name.

Ross, Sir John (1777-1856), sailor, Inch. Wigtonshire. He made 2 important voyages of polar exploration, the results of which he narrated in his *Voyage of Discovery for the Purpose of Exploring Baffin's Bay*, 1819, and *Second Voyage in Search of a NW. Passage, including the Discovery of the North Magnetic Pole*, 1835. For the first (1818) he was fitted out by gov., and for the second (1829-33) by private, enterprise. During

the latter he was for the most part ice-bound, and suffered severe privations. Consul at Stockholm from 1839 until 1845, he led an expedition in search of Franklin in 1850.

Ross, Martin (1862-1915), pseudonym of Violet Florence Martin, Irish novelist, b. Galway. She was educ. at Alexandra College, Dublin. With her cousin, Edith Oenone Somerville (q.v.), she collaborated in a number of novels.

Ross, Sir Ronald (1857-1932), physician and malarialogist, b. Almora, India, and educ. at St Bartholomew's Hospital, London. He entered the Indian Medical Service in 1881. While on leave in London in 1894 he met Patrick Manson (q.v.), who explained his hypothesis that malaria was transmitted by the mosquito. Ross returned to India, and in 1897-8 discovered the life-cycle of the parasite of bird malaria, thus proving Manson's theory. For his work he received the Nobel prize in 1902 and was knighted in 1911. In 1926 the Ross Institute and Hospital for Tropical Diseases was founded in his honour; Ross was its first director; in 1933 it was united with the London School of Hygiene and Tropical Medicine. R. was also a distinguished poet. His pubs. include *The Prevention of Malaria*, 1910, *Memoirs*, 1923, and *Studies on Malaria*, 1928; his poems were pub. in a collected ed. in 1928; he also wrote a novel, *The Child of Ocean*, 1889. See lives by R. L. Megroz, 1931; and J. O. Dobson, 1934.

Ross, Sir (William) David (1877-), Brit. scholar, b. Thurso, Caithness, and educ. at the Royal High School, Edinburgh, Edinburgh Univ., and Balliol College, Oxford. He became prof. of moral philosophy at Oxford in 1923. From 1929 until 1947 he was provost of Oriel, and was vice-chancellor of Oxford Univ. from 1941 until 1944. His edition of and commentary upon Aristotle's *Metaphysics* rank among the greatest works of modern scholarship, and he has pub. many works on philosophy. He was chairman of the royal commission on the press (1947). R. was knighted in 1938.

Ross and Cromarty, originally separate, were united in 1891 to form a N. highland co. of Scotland, including the Is. of Lewis (q.v.) except for the S. part called Harris, and many small is. mostly uninhabited. It is bounded to the N. by Sutherland and the Dornoch Firth and in the S. by Inverness-shire and the Beaulieu Firth. The coast-line is long and much indented; on the E. coast are the Beaulieu and Inner Moray and Cromarty Firths (which together nearly encircle the Black Is.) and Dornoch Firth. The Is. of Lewis provides one of the most striking monuments of neolithic Britain in the standing stones of Callanish (q.v.), and in the Doon of Carloway an excellently preserved specimen of an inhabited tower of the Pictish period. Knockfarrel, near Dingwall, is an ancient vitrified hill fort; good examples of castellated ruins are Lochalin and Ballone Castles. There are a number of pagan and early Christian Pictish

sculptured stones in the co., of which the Nigg stone is probably the finest example of early Pictish art in existence. Clan feuds apart, battles of national importance were Logiebridge, 1481, Invercarron, 1650, and Glenshiel, 1719. Hugh Miller, geologist; Sir Thomas Urquhart, translator of Rabelais; Sir Alexander Mackenzie, discover of the Mackenzie R., Canada; and Gen. Sir Hector Macdonald, who rose from the ranks, were natives of Ross-shire.

A considerable part of the co. is over 1000 ft, with 140 peaks exceeding 3000 ft. Best known are Ben Wyvis (3429 ft) in the NE., and An Teallach (3483 ft) in the NW., Benin Dearg (3547 ft), Sgurr na Lapaloh (3773 ft), Mam Soul (3862 ft), Benn Attow (3883 ft), Carn Elge (3877 ft), partly in Inverness-shire; by Loch Maree is Slioch (3217 ft), by Loch Torridon are Benin Elgie (3309 ft) and Liathach (3456 ft), and at the head of Loch Duich the stately Five Sisters of Kintail (3505 ft). The prin. rivs. are the Oykel and Carron, flowing E. to the Dornoch Firth, and the Conon, with its tribs., flowing to the Cromarty Firth; flowing W. are the Shiel, Elchalga, Carron, Ewe, and Broom. Many beautiful waterfalls include Glomach (370 ft), the highest in Great Britain. Fresh-water lochs are numerous; Loch Maree, 13½ m. long, is the largest. The climate is varied, and only about 7 per cent. of the whole surface is arable. Some of the richest agric. land in Scotland is in Easter Ross and the Black Is. (q.v.), and these are noted for the breeding of pedigree Shorthorn cattle. Oats and barley are the prin. grain crops, and there is a large crofting pop. Since the Second World War much of what was deer-forest land is now devoted to cattle and sheep grazing. The considerable timber area, denuded by two wars, is being gradually replanted, and there are hydro-electric schemes. Fisheries along both coasts are extensive, principally herring and white fishing, with salmon from the rivs. and estuaries. Chief fishing ports are Stornoway in Lewis, Cromarty, Ullapool, and Gairloch. Dingwall, co. in and royal burgh, is important; Stornoway, the largest tn, is the centre of the Harris tweed industry; Tain and Fortrose are royal burghs; Invergordon and Cromarty are seaports, and Strathpeffer is a holiday resort. The mainland is a parl. constituency returning 1 member; Lewis is part of the W. Is. constituency. From Kyle of Lochalsh there is a steamer service to Stornoway. There is a daily return air service from Inverness to Stornoway. Area 3089 ac.; pop. 62,000 (of whom 90 per cent in Lewis and 95 per cent on the mainland are bilingual in Gaelic and Eng.). See R. Bain, *History of the Ancient Province of Ross*, 1899; W. J. Watson, *Ross and Cromarty*, 1924; Macdonald and Polson, *The Book of Ross, Sutherland, and Caithness*, 1948.

Ross Dependency, ters. on the coasts of the Ross Sea in Antarctica which were proclaimed a Brit. settlement in 1923 under the control of the governor-general of New Zealand. It is an important

whaling centre, and was the scene of important Trans-Antarctic expeditions connected with the International Geophysical Year 1957.

Ross on Wye, mkt tn and urb. dist. of Herefordshire, England, on the R. Wye, 12 m. SE. of Hereford. It has many associations with John Kyrie (d. 1724), described by Pope as the 'Man of R.' The church of St Mary the Virgin is a fine Decorated and Perpendicular building. There are flour-mills and agric. implement factories. Pop. 5200.

Ross Sea, part of the Antarctic Ocean, first entered by Sir James Clark Ross (q.v.) in 1841, S. of New Zealand, lying between S. Victoria Land and King Edward VII Land. It is free of ice in the summer, and was therefore used as a way of approach to the S. Pole by both Amundsen and Scott, and also by later Amer. expeditions to 'little America' under Byrd (q.v.) and during the International Geophysical Year 'Operation Deepfreeze' (1957) under Dufek (q.v.).

Ross Sea Sector, part of Antarctica claimed by New Zealand between long. 160° E. and 150° W. Explored first by Capt. R. F. Scott (q.v.) in the *Discovery* (1901-4), and in the *Terra Nova* (1910-13). Also by Shackleton (q.v.) in the *Nimrod* (1907-9), and by the Amer. explorer Byrd (q.v.) in 1928-30 and 1933-5. The Balleny Is. and Scott Is. also form part of the sector. See R. F. Scott, *The Voyage of the 'Discovery'*, 1905; E. H. Shackleton, *The Heart of the Antarctic*, 1910; R. F. Scott, *Scott's Last Expedition*, 1913; R. E. Byrd, *Little America*, 1931, and *Antarctic Discovery*, 1936.

Rossall School, public school for boys at Rossall, Lancs, founded in 1844, and incorporated by royal charter in 1890.

Rossano (anc. Roscianum), It. tn, in Calabria (q.v.), near the coast of the Gulf of Taranto, 28 m. NE. of Cosenza (q.v.). It has a Byzantine archiepiscopal cathedral, and a library with valuable MSS. of the Gospels. Near by are marble quarries. Pop. 20,000.

Rosshach, Ger. vil. in the dist. of Halle. 15 m. S. by W. of Halle (q.v.). In 1757, during the Seven Years' War (q.v.), Frederick II here defeated the French and their allies under Marshal Soubise; the French lost 10,000 men. Pop. 2500.

Rossherg: 1. Mt (5194 ft high) on the borders of the cantons of Zug and Schwyz in NE. Switzerland.

2. See BYRON.

Rosse, William Parsons, third Earl of (1800-67), astronomer, b. York and educ. at Trinity College, Dublin, and Magdalen College, Oxford. In 1845 he constructed a giant telescope, 56 ft long, with a 6-ft speculum—the largest that had been made till then. After 1848 it was used for many years specially for the observation of nebulae.

Rousseau, small tn and lake port of Ontario, Canada, in Muskoka co., situated at the N. end of Lake R. Lake R. drains into Georgian Bay, Lake Huron. Lumbering is carried on.

Rossetti, Cosimo (1480-1507), It. painter, b. Florence, and studied under Neri di Bicci. His 'Last Supper' and 2 other frescoes were painted for the Sistine Chapel at the invitation of Sixtus IV. In S. Ambrogio, Florence, hangs his fine 'Procession of the Miraculous Chalice.' His pictures are dignified, despite a hard and mannered style and a monotony of gold and ultramarine. Fra Bartolommeo and Piero di Cosimo (q.v.) were his pupils.

Rossellino, Antonio (c. 1427-c. 1479), It. sculptor, b. Florence. His masterpiece, a tomb for a young Portuguese prince and cardinal who died in 1459, is in San Miniato, Florence, undamaged. The carving on this beautiful monument, like the marble medallion relief of the Virgin and Child now in the Bargello at Florence, suggests that R.'s style was a delicate, but less vigorous, adaptation of Donatello's. Of his 4 artist brothers, Bernardo R. (q.v.) is best known.

Rossellino, Bernardo (1409-c. 1464), It. sculptor, b. Settignano, but worked mainly in Florence. As an architect he designed buildings, and strongholds at Orvieto, Civita Vecchia, and Spoleto, and restored basilicas in Rome for Nicholas V and Pius II. The Victoria and Albert Museum possesses his relief-portrait of a doctor, and the church of Santa Croce, Florence, his splendid monument to Brunetti the historian (1443). He had 4 artist brothers, the sculptor Antonio Rossellino (q.v.) being best known.

Rossello, Maria-Josepha St (1811-88), b. Albisola, near Sabona, Italy. In 1837 she founded an institute of nuns, called the Daughters of Our Lady of Mercy, which rapidly spread through Italy and S. America. She was canonised in 1948.

Rosses Point, popular seaside resort, 4 m. NW. of Sligo, Rep. of Ireland, has a world famous championship golf course.

Rossetti, Christina Georgina (1830-94). Brit. poetess, sister of Dante Gabriel and Wm Michael R. (qq.v.), b. London. Even as a child she wrote verses, and her first recorded poem was completed at the age of 12. In 1847 a vol. of her verses was privately printed, and in 1850, over the signature of 'Ellen Alleyne,' she contributed to the famous but short-lived Pre-Raphaelite periodical, the *Germ*. In 1862 she pub. her best work, *Goblin Market and Other Poems*. *Goblin Market* is the high-water mark of Christina R., and shows such originality and imagination as appears in no other of her works. In this and other vols. she printed many exquisite lyrical pieces. The touch of sadness that pervades her writing may have been partly due to an unhappy love affair in her youth, and during her life she suffered constantly from ill health and a succession of a family bereavements. She possessed a sensitive appreciation of natural beauty, and her poetry has a unique simplicity and purity of tone.

Christina R. ranks with Donne, Crashaw, Blake, Traherne, and Vaughan as one of England's great mystical poets, and is, with Newman and Keble, one of the poets of the early Oxford movement. Though

the theme of her poems is often sad, the poems are never morbid or utterly gloomy, and her devotional poetry lays stress on ultimate hopes and realities. Critics have disputed whether she or Elizabeth Barrett Browning (q.v.) merits the title of greatest Eng. poetess. Among her other books are *A Prince's Progress*, 1866, *Annus Domini*, 1874, and *A Pageant*, 1884. A complete ed. of her works was issued with a memoir by her brother Wm R. in 1904, and her letters in 1908. See lives by M. F. Sanders, 1930, and D. N. Stuart, 1939.

Rossetti, Dante Gabriel (1828-82), Brit. painter and poet, b. London, son of Gabriele R., a Neapolitan refugee, who became prof. of It. at King's College, London, in 1831, and brother of Christina and Wm Michael R. (qq.v.). He was educ. at King's College School. Like his sister Christina, he exhibited a precocious taste for letters, and in 1840 composed a ballad, *Sir Hugh the Heron* (privately printed, 1843). He studied drawing under John Sell Cotman, and afterwards worked under Cary and at the Royal Academy schools. At this time, however, literature was more attractive to R. than art. He trans. Dante, beginning his labours in 1845, and 2 years later wrote *The Blessed Damozel* and sev. of his best sonnets. *The Blessed Damozel* and his prose story, *Hand and Soul*, appeared in the *Germ*, 1850, which was ed. by his brother Wm. He had already sought instruction in art from Ford Madox Brown, to whose influence he owed much, and he came into intimate relation with the Pre-Raphaelites (q.v.), Holman Hunt (with whom at one time he shared a studio) and Millais. He continued to work at literature and art, but he made little impression on the public. Ruskin (q.v.), however, had the knowledge and intelligence to appreciate R.'s work, and his influence did much to establish R.'s reputation. Between 1850 and 1860 he produced many of his best pictures, including 'Mary Magdalene' and 'Paolo and Francesca'.

In 1860 he married Elizabeth Siddal, who had sat to him for his Beatrices, but she died within 2 years. In his grief he buried his MS. poems in her coffin, but yielding to the entreaties of friends, he sanctioned their disinterment in 1869, and these and others were pub. in 1870. Unfortunately, after this he became addicted to the use of chloral which affected both his bodily and mental health, though he continued to paint many wonderful works, including 'Venus Astarte,' 1877. He attempted suicide in 1872 and suffered from partial paralysis from 1881. R. was a great artist, both with the pen and the brush, and it is often disputed whether he is greater as a poet or a painter. It is said that he never mastered some of the technicalities of art, but his imagination and his colouring lend a charm to his pictures that make them rank very high, while the music and symbolical qualities of his verse places him among the great poets of the 19th cent. His mysticism gives him an

affinity with Wm Blake. His poetical works, were collected in 1886, and his letters, with a memoir by his brother Wm. were pub. in 1895. See lives by F. G. Stephens, 1894; A. C. Benson, 1904; E. Waugh, 1928; J. C. Troxwell, 1930; V. Hunt, 1936; Helen Rossetti Angeli, 1948; O. Doughty, 1949. See also W. Gaunt, *The Pre-Raphaelite Tragedy*, 1942; K. Preston, *Blake and Rossetti*, 1944.



DANTE GABRIEL ROSSETTI

Rossetti, Gabriele (1783-1854), It. poet, the father of Dante Gabriel, Christina, and W. M. R. (qq.v.). He was endowed with a tenor voice which might have made his name in opera. In 1824, being banished from his country because of his Liberal ideas, he settled in London as a teacher of Italian at King's College. Besides his patriotic odes and other poems, he wrote 3 critical studies on Dante.

Rossetti, William Michael (1829-1919), Brit. author and art critic, brother of Christina and Dante Gabriel R. (qq.v.), b. London. He was educ. at King's College. He obtained a post in the inland revenue dept, but devoted his leisure to art and literature. He married Emma Lucy, a daughter of Ford Madox Brown, one of the Pre-Raphaelite Brotherhood, of which literary and artistic circle he became a member. For a short time he was editor of the *Germ*, which was founded in 1850 as the official organ of the brotherhood, and himself wrote the sonnet printed on the cover. He was probably the very last surviving close friend of Ruskin. R. is largely responsible for bringing about in England a true appreciation of the oriental, especially Jap., as opposed to the Caucasian faculty in fine art. His best-known pubs. were a trans. in blank verse of Dante's *Inferno*, 1866, a *Life of Keats*, 1887, *Memoir of Dante Gabriel Rossetti*, 1895, *Reminiscences*, 1906, and *Lives of Famous Poets*, 1878.

Rossi, Francesco dei, see SALVIATI.
Rossi, Giovanni Battista (1496-1541), It. painter, b. Florence. He formed his

style on that of Michelangelo. Invited to France by Francis I in 1530, he superintended the artistic decoration of the palace of Fontainebleau, and was one of the leaders of the Franco-Italian 'School of Fontainebleau.'

Rossi, Pellegrino Luigi Edoardo, Count (1787-1848), It. economist and statesman, b. Carrara, and educ. at Pavia and Bologna. He sought safety in Geneva after the fall of Murat, whom he had supported. In 1833 he accepted the chair of political economy at the Collège de France. He became Fr. ambas. at Rome, and later minister of the interior to Pope Pius IX, but was murdered because he opposed union with Savoy.

Rossini, Gioacchino (1792-1868), It. composer, b. Pesaro, the son of musical parents, soon learnt to sing and to play the horn and cello. In 1807 he began to study under Mattei at Bologna, and at the age of 18, when he had already written various things, produced quite a mature comic opera, *La cambiale di matrimonio*, at Venice (1810). For the next 19 years he went from success to success, all over Italy at first and before long all over Europe. Of his 38 operas the best were *La scala di seta* (Venice, 1812), *Il Signor Bruschino* (Venice, 1813), *Tancredi* (Venice, 1813), *L'Italiana in Algeri* (Venice, 1813), *Elisabetta, regina d'Inghilterra* (Naples, 1815), *Otello* (Naples, 1816), *Cenerentola* (Rome, 1817), *La gazza ladra* (Milan, 1817), *Mosè in Egitto* (Naples, 1818), *La donna del lago* (after Scott) (Naples, 1819), *Semiramide* (Venice, 1823), *Le Comte Ory* (Paris, 1828), and *Guillaume Tell* (Paris, 1829). But the outstanding masterpiece is *Il barbiere di Siviglia*, on Beaumarchais's comedy, which first failed at Rome in 1816 because the public resented It.'s use of a libretto already set by Paisiello, whose work was nevertheless soon killed by the superiority of It.'s. In 1822 he married the Portuguese singer Isabella Colbran and had his first great success in Vienna. They went to London and Paris, where he settled for the rest of his life, except intermittent stays at Bologna, when he directed the Liceo Musicale from 1839 to 1848, and the years 1848-55 spent at Florence. Discouraged by the successes of Fr. opera composers and especially of Meyerbeer, he ceased producing works for the stage at the age of only 37 and wrote only the *Stabat Mater*, 1832-42, the *Petite Messe solennelle*, 1863, and small occasional works. See lives by A. Bonaventura, 1934; Lord Derwent, 1934; G. Radiciotti (3 vols.), 1927-9; F. Toyo, 1934.

Rossire, seaport of co. Wexford, Rep. of Ireland, and terminus of the mail-boat service from Fishguard. It extends along the coast, which to the S. forms Carnsore Point, the extreme SE. corner of Ireland. Lady's Is. is the site of an ancient monastery. To the N. is the seaside resort of R. Strand, which is the S. boundary of Wexford Harbour. Pop. (of R. Harbour) 900; (of R. Strand) 800.

Rossiau, Ger. tn in the dist. of Halle, on the Elbe opposite the mouth of the Mulde,

32 m. NNE. of Halle (q.v.). It was incorporated with Dessau (q.v.) 1935-45. There are textile, chemical, and boat-building industries. Pop. 18,000.

Rosslyn, Earl of, see WEDDERBURN.

Rosslyn, see ROSLIN.

Ross-shire Buffs, see SEAFORTH HIGH-LANDERS.

Rostand, Edmond 1868-1918), Fr. dramatist and poet, b. Marseilles. His farcical *Les Romanesques*, 1894, was followed in 1895 by *La Princesse lointaine*, in which Sarah Bernhardt interpreted the character Méliandre; she also played Pholine in his biblical play, *La Samaritaine*, 1897, and the Duke of Reichstadt in *L'Aiglon*, 1900. In this tragedy the pathos of the life of surveillance and misunderstanding which Napoleon's son was condemned to lead is beautifully expressed. The heroic drama *Cyrano de Bergerac*, 1897, in which Coquelin created the title-role, was an outstanding success; in 1910 this was followed by the farmyard fantasy of *Chantecler*, the production of which was a triumph of magnificent and artistic effects. *Les Musardises*, 1911, was in the main a reissue of his early poems. R.'s versatility is shown by the variety of his dramatic productions; but his best work was that done in the romantic tradition, where fine prose, skilful characterisation, and a vivid insight into human emotions, particularly of the frustrated, combined to produce masterpieces. In 1902 R. was elected to the Fr. Academy. See lives by G. Haraszti, 1913; P. Aposteguy, 1929; and R. Gérard, 1935.

Rostock: 1. Dist. (*Bezirk*) of the Ger. Democratic Rep. (E. Germany), lying along the coast of the Baltic Sea, and bounded on the S. by Schwerin and Neubrandenburg (q.v.). It was formerly part of Mecklenburg (q.v.). It includes the is. of Rügen (q.v.). Area 2754 sq. m.; pop. 850,000.

2. Ger. city, cap. of the dist. of R., 118 m. NNW. of Berlin. It is on the Baltic Sea, at the head of the estuary of the R. Warnow, 8 m. from the riv. mouth. The city was founded in the 12th cent. on the site of a Wendish stronghold, and was once a member of the Hanseatic League (q.v.). During the Second World War it was one of the chief Ger. supply bases for the Russian front, and the home of the Heinkel aircraft works and various chemical industries. It was bombed heavily by the R.A.F., and was severely damaged. It was taken by the 2nd White Russian Army, under Rokossovsky (q.v.), in May 1945. There are sev. Gothic churches and a Gothic tn hall. The univ. dates from 1419. The port is busy (oil imports), and there is an outpost at Warnemünde (q.v.). Hülcher (q.v.) was a native. Pop. 140,000.

Rostov: 1. Tn. in Yaroslavl' Oblast (Central Russia), 35 m. SW. of Yaroslavl'. It has many outstanding churches of the 13th-17th cents. Pop. (1933) 23,500. The town has been known since 862; it was cap. of Central Russia in the 11th cent., and of R. principality in 1207; it

was conquered by the Muscovites in 1474, became a seat of the Orthodox metropolitan in 1587, and was an important commercial centre during the 16th-19th cents.

2. Oblast in the S. of European Russia, situated largely S. of the lower Don. Area 24,100 sq. m., pop. (1956) 1,922,000, Russians (since 16th cent. mostly Cossacks, before 1944 also Kalmyks). There are large engineering (agric. machinery, locomotives, machine tools, kettles), food (flour, meat, etc.), and shoe-making industries. Wheat, sunflowers, and vegetables are grown; there is also the breeding of cattle, sheep, and horses (Don breed). The princ. towns are Rostov-on-Don, Taganrog, Novocherkassk.

3. Rostov-on-Don, cap., economic and cultural centre of the above, on the Don, 25 m. from its mouth. It is one of the largest engineering centres in Russia (agric. machinery since 1898, aircraft, shipbuilding, etc.); there are also tobacco and other food industries, shoe-making and textile industries. It is an important transportation centre (transfer from sea-going and riv. ships to railway and vice versa)—gateway to Caucasus. It is the most important cultural centre of the N. Caucasus and the adjacent regions (univ. founded in Warsaw 1869, transferred to R. 1917). Pop. (1956) 552,000 (1914. 200,000; 1930. 177,000; 1926. 308,000; 1939. 510,000), Russians and Armenians. Founded in 1761 as a fortress, it has been a town since 1797 (absorbing the port Temernik, founded 1749); it was included in the Don Cossack Region in 1838, absorbed Nakhichevan-on-Don (q.v.) in the early 1920s, and was cap. of the N. Caucasus 1923-34. It has been a commercial centre (export) from the early 19th cent., and its industrial development dates from 1846. During the Civil War it was held by the Whites 1918-20. It was occupied by the Germans in 1918, 1941, and 1942-3.

Rostovtsev, Mikhail Ivanovich (1870-1952). Russian historian and archaeologist, was 1901-18 prof. at St Petersburg Univ., 1920-4 at the univ. of Wisconsin, and from 1925 at Yale. His works on ancient hist. have greatly influenced modern opinion on the subject. See his *Iranians and Greeks in South Russia*, 1922; *The Social and Economic History of the Roman Empire*, 1926; *A History of the Ancient World* (2 vols.), 1926-7; *The Social and Economic History of the Hellenistic World* (3 vols.), 1941.

Rostra, famous platform in ancient Rome, from which public speakers used to address the people. It stood between the forum and comitium, and was so called because it was adorned with prows of warships captured from Antium in 338 BC. In modern English the singular form, *rostrum*, is used only.

Roswell, cap. of Chaves co., SE. New Mexico, U.S.A., on Rio Hondo 170 m. SE. of Albuquerque. It is a trade centre and resort, and a wool-shipping point in a livestock and irrigated area (cotton, grain, fruit, garden produce); food

processing of meat and dairy products, oil refining. R. manufs. cotton gins, cottonseed oils, paints, and mattresses. Oil wells and potash mines are near by. New Mexico Military Inst. is here, and Walker Air Force base and state parks are in the vicinity. Pop. 25,738.

Roswitha, or Roswitha, see HROSWITHA. Rosyth, naval base on the firth of Forth, forming part of the city and royal burgh of Dunfermline, Fife, Scotland, on the N. of the estuary, at St Margaret's Hope. Started in 1903, it was nearing completion at the outbreak of the First World War, and soon became important as a repairing base and H.Q. of the cruiser squadrons. It was reduced to a maintenance base in 1925, but reopened in 1939 on the outbreak of war, and was the main port of assembly for the Norwegian expedition of May 1940. R. Castle is a ruin, 2 m. to the W. of Inverkeithing. Near here, on Tower Hill in Pittencrieff Glen, lived Queen Margaret, wife of Malcolm Canmore. In St Andrew's Church in 1946 was dedicated a boat-shaped pulpit given by R. Destroyer Command, in memory of the men of the 'little ships.'

Rotary Converter, see CONVERTER, ROTARY.

Rotary International, organisation aiming at establishing the principle of service, international peace, and good fellowship as the foundation of all business transactions. R. I. consists of clubs which are composed of representatives—business and professional men—selected on a classification basis. The first club was started in 1905 by Paul P. Harris (d. 1947), a Chicago lawyer. The name 'Rotary' is derived from the early practice of holding meetings in rotation at the offices of the various members. The New York Rotary Club was founded in 1909, and there are now (1956) 4912 clubs in the U.S.A. and Canada. Outside America the first Rotary Club to be formed was in Dublin in 1911, and in 1914 the Brit. Association of Rotary Clubs was estab. In 1922 this association became known as R. I.: Association for Great Britain and Ireland, the title R. I. being adopted for the organisation by all clubs in that year. In 1938 the Brit. and Irish Association changed its title to the R. I. in Great Britain and Ireland. In Great Britain and Ireland there are now (1956) 816 clubs, while the total number of clubs in the world is 9187 in 99 countries, with a total world membership of 435,000. The Rotary motto is 'Service above Self.'

Rotating Wing Aircraft, see VERTICAL TAKE-OFF AIRCRAFT.

Rotation. A line is said to rotate when one point is fixed and the other points describe circles round it in the same plane, all the points maintaining the same relative positions. A plane may rotate about any point or line within it or on its bounds. A solid rotates when its parallel planes rotate round a series of fixed points within it, forming a straight line. This series is the *axis of rotation*. The planets and other celestial bodies have R.s, i.e.

spinning, about their axes. All particles not in the axis move in circles. The speed of each particle is the product of its angular velocity, measured in radians per sec., and its distance from the axis. Angular velocity is geometrically represented by a vector drawn along the axis of rotation, and of length equal to this speed. R. is thus change of direction of a vector. See QUATERNIONS; VECTORS.

Rotation of Crops, system of growing crops in some particular order with the objects of utilising fully the plant foods in the upper and lower part of the soil; of checking insect and fungus pests by depriving them for a period of their essential food; of distributing labour economically; and of providing a variety of food for cattle and other livestock. The most primitive R. is that of cropping the land annually with a cereal until it ceases to be profitable, and then allowing it to revert to weeds, which ultimately form a rough pasture, until in course of time the land has regained a certain amount of fertility. This wasteful system still prevails to some extent in the newer countries, where the virgin soil is exploited until it ceases to be productive and then allowed to revert to prairie. A great advance on this was the medieval system of dividing the tillage area between a winter cereal (wheat or rye), a spring cereal (barley or oats), and bare fallow or beans. Various modifications were made with the introduction of new crops, until in the first half of the 18th cent. the following famous Norfolk or 4-course R. was evolved: In the first year an autumn-sown cereal—wheat; in the second year roots—turnips, mangolds, potatoes, cabbage, etc.; third year, spring-sown cereal—barley or oats; fourth year, leguminous crop—clover, peas, or beans. For the conditions prevailing up to 1914 this R. was ideal, and was associated with flocks of sheep, which were folded across the forage crops, and cattle kept in yards, mainly for the farmyard manure which they produced. However, the profitability of both these forms of livestock production is now much reduced, and the 4-course R. is rarely used in its original form. But by various modifications, such as lengthening the R. to 5, 6, or 8 years, and the introduction of other crops, quite satisfactory results have been obtained. The success of these R.s is dependent on retaining the general principles on which the 4-course R. was based. See also CROPS; LEY FARMING.

Rotche, or Little Auk, species of Alcidæ (q.v.), *Alle alle*. During the winter it frequently migrates to Great Britain, and at breeding times it is often seen in great numbers in Greenland. Its length is about 8½ in.; its bill is short, broad, and black; the plumage is greyish-black above, white below, and there is a small white spot above the eye.

Roth, Stephan Ludwig (1796–1849), Ger. writer and educational reformer, b. Mediasch. He was an enthusiastic follower of Pestalozzi, and attempted to put his ideas into practice.

Rothamsted Park, estate 4 m. NW. of St Albans, noted for the scientific experiments in agriculture which were carried on by Sir John Bennet Lawes (d. 1900), and which, owing to his munificent endowment of £100,000, are still being carried on under the Lawes Agricultural Trust. The station now receives gov. assistance and is one of the chief centres of agric. research in the world.

Rothe, Richard (1799–1867), Ger. Protestant theologian, b. Posen, successively member, prof., director, and episcopus of the Theological Seminary of Wittenberg. In 1837 he became prof. of theology at Heidelberg. His prin. work is the *Theologische Ethik* (3 vols., 1845–8; 2nd ed., 5 vols., 1867–71), a complete system of speculative theology or theosophy. See study by J. Happel, 1909.

Rothenburg ob der Tauber, Ger. tn in the Land of Bavaria standing high above the valley of the Tauber, 137 m. NW. by N. of Munich (q.v.). It was once a free city of the Empire, and has still a wealth of medieval architecture. The anc. walls, with gates and towers, remain intact; and there are old houses with fine gables, curious fountains, and notable churches: the Franciscan church dates from the 13th cent., and in the 13th–15th-cent. church of St Jacob there is a carved altar by Tilman Riemenschneider (q.v.). During the summer months festivals are held in the tn. Pop. 12,000.

Rothenstein, Sir John (Knewstubb Maurice) (1901–), b. London, son of Sir W. R., and educ. at Bedales School and Worcester College, Oxford, and London Univ. He was prof. of art hist. at the univs. of Kentucky and Pittsburgh, but returned to England to become director of the City Art Gallery in Leeds, and of the City Art Galleries and Ruskin Museum in Sheffield. In 1938 he became director of the Tate Gallery, showing enterprise and imagination in this post. His pub. on Eng. and Fr. painting include *The Life and Death of Conder*, 1938, *Augustus John*, 1943, *Introduction to English Painting* (2nd ed.), 1949, *One Hundred Modern Foreign Paintings in the Tate Gallery*, 1949, *Modern English Painters*, vol. 1, 1952, vol. 2, 1956.

Rothenstein, Sir William (1872–1945), artist, b. Bradford and educ. at Bradford Grammar School. He was trained at the Slade School and in Paris by Lefebvre and Constant, but it was Degas and Whistler who really discerned the quality of his gifts. At 19 he began a series of portrait drawings, including numerous persons famous in literature, such as Patmore, Swinburne, and Hardy. In the First World War he served as an official artist in France with the Brit. and Canadian forces. He was principal of the Royal College of Art from 1920 to 1935 and prof. of civic art at Sheffield Univ. from 1917 to 1926. His work includes lithographs and etchings, as well as landscapes and portraits and interiors in oil, and is represented in the prin. galleries of Great Britain, the Dublin Gallery of Modern Art, and in the Metropolitan

Museum of New York. His 'Jews mourning in the Synagogue'—included in his series of Jewish pictures which began with 'The Talmud School'—is in the Tate Gallery, which also has his 'The Doll's House.' His visit to India to study the Durbar had a marked influence on his painting, increasing his sense of light and colour, and, in 1910, he took an active part in the formation of the India Society to promote an appreciation of Indian art and letters. Sev. collections of his lithographic portraits were pub. between 1897 and 1937. He completed over 200 portraits of alrmen during the Second World

The chapel of Our Lady (c. 1483) on the old R. Bridge is 1 of only 4 extant chapels built on bridges in England. The chapel was later used as the tn prison, but in 1924 it was restored and rededicated. In 1930 a new bridge over the Don at this point was completed. Important buildings include the tn hall, the council offices, and the central public library. The grammar school for boys was founded in 1483. There are 11 parks and open spaces covering 500 ac. In Clifton Park is the mansion house, which has been converted into a museum. Places of interest near R. include Conisborough Castle (men-



D. McLeish

THE PLÜNLEIN, ROTHENBURG OB DER TAUBER

War, which he presented to the nation. He wrote *Oxford Characters*, 1896, *English Portraits*, 1898, *Manchester Portraits* 1899, *A Life of Goya*, 1900, *A Plea for Wider Use of Artists and Craftsmen*, 1917, *Ancient India*, 1926, *Men and Memories*, vol. i, 1931, vol. ii, 1932, vol. iii, 1939. He was knighted in 1931. See J. Rothenstein, *The Portrait Drawings of William Rothenstein*, 1926.

Rotherham, co. bor. of the W. Riding of Yorks, England, situated between Sheffield and Doncaster at the junction of the Rother with the Don, 6 m. from Sheffield. R.'s most important architectural and historical building is the par. church of All Saints', dating back to Saxon times. The present building is a very fine specimen of the Perpendicular style, and contains some 16-cent. stalls and benches, and a fine pulpit (1603).

tioned in Scott's *Ivanhoe*, Roche Abbey, and Wentworth Woodhouse. There was a Rom. post near the present centre of the tn, and R. in Domesday Book is mentioned as possessing a church and a mill. The industrial hist. of R. begins in 1746, when the first furnace for iron-working was built by Samuel Walker.

To-day R. is a busy modern centre of industry and commerce. There is coal mining in the vicinity, and R. is the railway clearing-house of a large colliery area. There are large iron and steel and brass-works; iron and steel sheets, bars and rods, etc., are made as well as a wide range of manufactured articles, such as rails, wheel disks, cranks, and piston-rods. Other industries include general engineering, glass-blowing, corn-milling, the manuf. of oxygen, and of windows, doors, and staircases. R. became a

corporate tn in 1871. It is a bor. con. constituency. Pop. 82,070.

Rotherhithe, see BERMONDSEY.

Rothermere, Harold Sidney Harmsworth, Viscount (1868-1940) Brit. newspaper proprietor, younger brother of Viscount Northcliffe (q.v.), b. London. He became, at 21, a partner in the publishing business known then as Harmsworth Brothers, later as the Amalgamated Press. When the *Evening News* was taken over by the Harmsworth house he reorganised that paper, and he assisted in the founding of the *Daily Mail*, 1896. In 1910 he founded the King Edward chair of Eng. literature, Cambridge, and received a baronetcy. From 1914, having already severed his connection with his brother's papers, he was proprietor of the *Daily Mirror*, supplemented by his founding of the *Sunday Pictorial* a year later. On the death of Lord Northcliffe in 1922, R. acquired control of the *Daily Mail*. R. became Baron R. in 1914 and received a viscounty in 1919. During the First World War he was air minister (1917-18). See Viscount Camrose, *British Newspapers and their Controllers* (revised ed.), 1948.

Roths, burgh of Morayshire, Scotland, on the R. Spey, 10 m. SE. of Elgin. It has distilleries. Pop. 1400.

Rothsay, David Stewart, first Duke of (1378-1402), son of Robert III. of Scotland. He succeeded to his father's original title of Earl of Carrick. Owing to the king's defects of character, the management of the affairs of the kingdom devolved on his brother the Earl of Fife, but the estates decided that David, then Earl of Carrick, as heir to the throne, should assume sovereign powers, and at the same time David was created Duke of R., and his uncle, Fife, was made Duke of Albany, these being the first examples of the ducal title in the hist. of Scotland.

Rothsay, royal and municipal burgh and co. tn of Bute, Scotland, on the is. of Bute, 30 m. W. of Glasgow. There is a good harbour, fishing is carried on, and it is a popular tourist centre and holiday resort. In 1816 the marquess of Bute restored the anct castle (founded in 1098). Craigmore adjoins R. on the E. and Port Bannatyne on the N. Pop. 10,145.

Rothorn, Swiss mt mass (7714 ft) overlooking the N. shore of Lake Brienz. The fine panorama from the top attracts tourists, who can ascend by mt railway from Brienz.

Rothschild, Jewish family famous for their immense financial transactions. The founder of the family was Mayer Amschel R. (1743-1813), of Frankfurt-on-Main. There are various theories as to the origin of the surname, some tracing it to a place-name; but it is most generally supposed to represent the red shield which was the sign of the house at Frankfurt. After the founder's death, his eldest son, Amschel Mayer (1773-1855), carried on the Frankfurt business, the other 4 sons having opened branches: Solomon (1774-1826) at Vienna; Nathan Mayer (1777-1836) in London; Karl (1780-1855) at Naples; and

James (1792-1868) at Paris. One reason of their success was collaboration. In the London house Nathan was succeeded by Lionel (1808-79), who was returned to Parliament for the city of London in 1849 and 1852, but on account of his faith was unable to sit until 1858. He was M.P. till 1874, and at his death was succeeded in the business by his son Nathan (1840-1915), who was raised to the peerage as Baron Rothschild in 1885. Nathaniel Mayer Victor R. (b. 1910) succeeded to the title as third baron in 1937. See Count Corti, *The Rise of the House of Rothschild*, 1928, and M. E. Ravage, *Five Men of Frankfurt*, 1929.

Rothwell: 1. Urb. dist., including Methley, (in W. Riding) Yorks., England, 4 m. SSE. of Leeds. There is a co-educational grammar school. The dist. has coal mines and brick and copper-tube works; rhubarb is grown. Pop. 23,780.

2. Urb. dist., 4 m. NW. of Kettering, in Northants, England, with manufs. of boots and shoes and agric. implements. Pop. 4800.

Roti, is. of Indonesia, SW. of Timor, across R. strait. Cotton, sugar, soya beans, indigo, etc., are produced. Area 467 sq. m. Pop. 69,000.

Rotifera, or Wheel Animalcules, phylum of minute animals consisting of about 1200 species, most of them about $\frac{1}{16}$ in. and the largest not more than $\frac{1}{8}$ in. in length. They occur mostly in fresh water, but a number of species have been found in the sea and others in damp moss. Their distribution is very extensive, and experiments by James Murray, while in the



ROTIFERA

Antarctic with the Brit. Antarctic expedition (1907-9), showed that -40° F. did not kill them. The fresh-water forms, which are numerous in the Antarctic, were also able to endure a month's immersion in brine. R., in spite of their small size, are fairly complicated in structure; they are triploblastic (3-layered) and consist of head, body, and foot. The head bears a disk of cilia, the

the supervision of the chief engineer of the town, C. van Traa, rebuilding has progressed steadily during the last 10 years. There are many examples of modern architecture, such as the new shopping centre *Lijnbaan*, and the new department store the *Bijenkorf*, which was designed by Breuer and Elzas. Most of the large new buildings are decorated with fine modern sculptures, the monument in memory of the Second World War, which stands close to the harbour, is by the Fr.-Russian sculptor Zadkine. A long-term project is planned for the construction of a dyke to protect a part of the tn which was formerly flooded at high tide. See J. Schraver (ed.), *Rotterdam, the Gateway to Europe*, 1948; C. van Traa (ed.), *Rotterdam, der Neubau einer Stadt*, 1957. Pop. (1958) 730,000.

Rottlera, genus of tropical plants belonging to the family Euphorbiaceae, and natives of Asia and Australasia. *I. tinctoria* (synonym *Mallotus philippinensis*) from Malaya is important for 2 products, an orange dye and a remedy in cases of tapeworm.

Rottwell, Ger. tn in the *Land* of Baden-Württemberg (q.v.), on the Neckar (q.v.), 48 m. SW. by S. of Stuttgart. It stands on the site of a Rom. settlement, and was once a free city of the Empire. It has anct churches and towers and fine old houses. There is an interesting collection of medieval carvings and sculptures, and there are 2 museums. Machinery and textiles are manufactured. Pop. 17,000.

Rotuma, volcanic is. of the S. Pacific, annexed in 1880 to the Brit. colony of Fiji (q.v.), which lies 300 m. SSE. Copra is exported and mats are made. Area 18 sq. m.; pop. c. 3000.

Rotunda (Lat. *rotundus*, round), either (i) a circular building, usually domed, e.g. the Pantheon (q.v.) at Rome; or (ii) the domed central feature of a large building, e.g. St Paul's Cathedral, London.

Roturier (perhaps from Low Lat. *rup-tarius*, one who breaks the earth), in the days of feudalism a citizen who held his ground by allodial tenure as opposed to knight service. Thus anyone who was not noble came to be designated R. Unlike the knights, the R.s were obliged to serve in the militia, and were put to death by hanging instead of decapitation. See **FEUDALISM**.

Rou, see ROLLO.

Rouault, Georges (1871-1958), Fr. painter, b. Paris. He served an apprenticeship under a painter of stained glass, and later studied at the Beaux-Arts under Gustave Moreau. He gradually turned from academic themes to the world of circus and theatre, and after 1918 he showed a religious vein. R. belongs primarily to the Expressionist school, conveying, that is, a personal mood or emotional state, and his work possesses some element of mysticism. His impressively tragic religious paintings set him apart from contemporary artists, though he is numbered among the most important. A resemblance to Daumier appears in

such devastating social comment as appears in 'Les Noceurs' (Tate Gallery). He has illustrated many books. See studies by G. Soby, 1917; M. Puy, 1920; R. Cogniat, 1930; L. Venturi, 1940; also Skira, *History of Modern Painting—Matisse, Munch and Rouault*, 1950.

Roubaix, Fr. tn in the dept of Nord, on the R. canal, 6 m. NE of Lille. It has been a prosperous cloth-making tn since the 15th cent, and together with Tourcoing (q.v.) is the centre of the Fr. woollen industry. There are also other textile, chemical, and machinery manufs. The R. canal connects with the Scheldt. Pop. 101,000.

Roubillac or Roubiliac, Louis François (1695-1762), Fr. sculptor, b. Lyons, and trained under Nicolas Coustou in France, but worked in England, where his portrait busts and monuments came into great demand. In Westminster Abbey is his monument to Handel, and one of his best works, the monument to Mrs. Nightingale. His statues of Sir Isaac Newton and George I were erected in Golden Square, London. He executed also a good bust of Pope, and a statue of Shakespeare, now in the Brit. Museum.

Rouble (Russian rubl'), unit of the Russian monetary system. The official exchange rate in 1956 was 11.40 R.s = £1, but the real purchasing power of the R. on the internal Russian market is about 6d. There are 100 kopeks in 1 R.

Roucy, Anne, see GIRONDET-TROISON.

Roudnice (Ger. Raudnitz), Czechoslovak tn in the region of Ústí and Labem (q.v.), on the Labe (see ELBE). It has a castle with a notable library and collection of paintings. Pop. 8700.

Rouen (anct *Rotomagus*), Fr. city, cap. of the dept of Seine-Inférieure, situated on both banks of the Seine (q.v.). The riv. is tidal as far as the city, and R. is thus a port of importance; it is also a busy railway junction. The Romans Latinised the Celtic name *Ratuma* into *Rotomagus*, and the tn became of note ecclesiastically as early as the 3rd cent., when St Mellonius was its bishop; it is now the seat of an archbishopric. It was the cap. of Normandy (q.v.), and here Wm the Conqueror d., Arthur of Brittany was murdered, and Joan of Arc was burned (qq.v.). The city underwent a protracted siege by Henry V of England. At the end of the 15th cent. R. was the centre of the Fr. Renaissance. It was occupied by the Germans in 1870 (see FRANCO-GERMAN WAR). During the First World War it was an important Brit. base, and during the Second World War it was taken by the Germans in June 1940 and recovered in Aug. 1944. Broad, modern roads have been driven through the old tn, but it remains full of interesting and beautiful buildings, though many suffered damage and some were totally destroyed during the Second World War. The cathedral, on the site of a previous church, dates from the 13th to 16th cents. The W. façade, a fine example of the Fr. Flamboyant style, has 2 towers of widely different dates: the N. is mainly of the

Rouen

12th cent., whereas the S. was not completed until the 16th. The central spire, 485 ft high, is modern. Other churches of importance are the 14th-15th-cent. church of St Ouen, with an octagonal central lantern, which is somewhat spoiled by its modern W. front, and the church of St. Maclou, begun in 1437, which is another excellent example of Fr. Flamboyant architecture. The very fine Gothic Palais de Justice (late 15th and early 16th cents.) was badly damaged in 1944. One of the best-known buildings of the city is the Grosse-Horloge, a

Rouge, red powder used as a cosmetic. It is prepared by rubbing up a base such as Fr. chalk with oil and a colouring matter. The colours used in the better qualities are carmine, from cochineal, and carthamine, from the safflower. *Jerrell's rouge* is a red powder used for polishing. It consists of the iron oxide obtained by calcining ferrous sulphate.

Rouge et Noir, see TRENTÉ ET QUARANTE.

Rouge River, SE. Michigan, U.S.A., rises in Oakland co., flows 30 m. S. and E. through Dearborn and Detroit to

ROUEN



French Government
Tourist Office

Renaissance pavilion containing a 15th-cent. clock, and another building of note is the Tour de Jeanne d'Arc, in which the saint was imprisoned before being burned. The Hôtel de Bourgtheroulde (1501-37) is the best example of the city's ancient domestic architecture. R. has museums, a library, and a fine art gallery. Corneille, Molière, Racine, and Flaubert (qq.v.) were natives of the city. The chief industries of R. are connected with textiles, in particular cottons. It is the chief port of France for the import of oil and coal, and it has also metallurgical, chemical, engineering, and paper industries of importance. There is a large trade in wine. Pop. 116,600. See T. A. Cook, *Rouen*, 1928; A. Maurris, *Rouen*, 1929; P. La Catheux, *Rouen au temps de Jeanne d'Arc*, 1932.

Detroit R. at River Rouge City. It is navigable for deep-draught vessels. The prin. freight is ores, limestone, coal, and petroleum for the industries of the Detroit area. It is some 58 m. long.

Rougemont, L. de, see DE ROUGE-MONT.

Rouget de Lisle, Claude Joseph (1760-1836), Fr. poet and song-writer, b. Longueville-Saunier, famous for a single composition, the *Marseillaise*, 1792, which he composed at Strasburg in an outburst of patriotism. At the time he was capt. in the engineers. Other works include the collection *Cinquante chants français*, 1825, and *Essais en vers et en prose*, 1797.

Rough Collie, see COLLIE.

Rough Fell Breed, see SHEEP.

Rough-haired Pinscher, see SCHNAUZER.

Rough Riders, term originally applied to those who broke in horses. Later it

was used for cavalry and artillery soldiers who trained the horses. Certain bodies of mounted men raised for military service adopted the name, e.g. the regiment raised by Theodore Roosevelt during the Sp.-Amer. war, and the City of London Yeomanry.

Rouher, Eugène (1814-84), Fr. politician, b. Riom. He became a barrister but then entered politics, and in 1850 as Minister of Justice supported a Bill for limiting the suffrage. He was appointed successively minister of agriculture, commerce, and public works, and helped to further the policy of free trade. In 1868 he carried sev. Bills restricting public meetings and the freedom of the press, and his later years were devoted to the unquestioning service of Napoleon III and, after 1870, of the Bonapartist party, Thiers being his most formidable opponent.

Roulers, see ROSECLARE.

Roulette, in mathematics, curve traced by any point in the plane of a given curve when the latter rolls, without sliding over another fixed curve. The rolling curve is the generating, the fixed one the directing, curve. The cycloid, epicycloid, etc., are simple examples. See CURVES.

Roulette, gambling game, played with the aid of a wheel (*roulette*) let into the centre of an oblong table covered with a green cloth. The table is divided into 3 columns of figures, marked from 1 to 36 alternately in red and black. The 6 spaces at the 2 sides of the columns of figures are called, respectively, *rouge*, to mark red numbers; *noir*, for black numbers; *impair*, for odd numbers;

alternately red and black, the thirty-seventh space being the 0 or zero. The object of the game is simply to win money by placing stakes on a fancied number. The players having put their stakes on that portion of the cloth which represents the chance selected, the *tourneur* or croupier throws a small ivory ball round the ledge of the wheel, at the same time revolving the cylinder in the opposite direction. When the wheel stops the ball drops into one of the little compartments, the number of which is the winning number. If for example, it is 27 the croupier announces, 'Vingt-sept, rouge, impair et passe,' rakes the lost stakes into the bank, pays the winner, and goes on again as before. There are different methods of staking, and the greater the odds, the smaller is the maximum stake allowed.

There is a simple form of roulette called *petits chevaux*. It is a species of race-game, the horses, which are numbered, being fixed on to some contrivance which enables them to be sent twirling round a model course. The horses are fixed in different relative positions, and the one that is nearest the winning-post when the wheel or other rotatory contrivance stops is the winner.

Roumania, see RUMANIA.

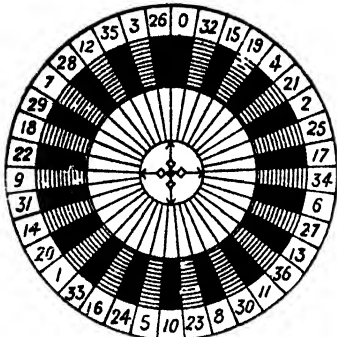
Roumanille, Joseph (1818-91), Provençal man of letters, b. St Rémy. He was a teacher for some time and then became a publisher. In 1847 he brought out his first book of poems, *Li Margarideto* ('The Easter Daisies'), and later collected his verses in *Lis oubrelo*. He founded with Mistral (q.v.), his famous disciple, the Society of the 'Félibrige' (1854), and in 1855 popularised Provençal in his newspaper *L'Armana Provençal*, in which appeared a delightful series of tales, including *Le Curé de Cucunhan*, which were afterwards collected in *Lis oubrelo en Proso* ('Prose Works'). See study by J. Aron, 1928.

Roumella, see RUMELIA.

Round, or *Rota*, kind of canon (q.v.) best defined by saying that its successive entries consist of complete melodies rather than mere phrases. The entries are thus apt to lie farther apart. Unlike canons R.s are always sung with the theme in its original position or in the octave, never at other intervals. An older name for the R. was *rota*: *Sumer is icumen in*, known as the 'Reading rota,' is a typical early R. Familiar later examples are in the second finale of Mozart's *Così fan tutte*, and the quartet in the first act of Beethoven's *Fidelio*.

Round Robin (Fr. *rond*, round, and *ruban*, ribbon), petition signed strictly in a circular form so that no individual's name need appear first. A famous protest in this form was sent by Reynolds, Burke, Gibbon, and others to Dr Johnson imploring him to rewrite Goldsmith's epitaph.

Round Table, non-political and non-sectarian organisation of young business and professional men between the ages of 18 and 40 for the development of fellow-



ROULETTE WHEEL

manque, numbers from 1 to 18; *pair*, even numbers; and *passe*, all numbers from 19 to 36. The wheel itself contains a brass cylinder within a narrow, inclined ivory ledge, and is made to revolve on a pin by means of a cross-head. The outer edge of this cylinder is partitioned into 37 small compartments numbered irregularly from 1 to 36, and coloured

ship, service to the community and the promotion of international understanding. It was founded in 1928 by Louis Marchesi, a young Rotarian, who believed a need existed for a parallel movement reserved for young men only. With this, the Rotary Conference of 1928 concurred, and a bond of affinity exists between the 2 movements. The first Overseas R. T. was formed at Copenhagen in Mar. 1936, and the movement now thrives in Central, E. and S. Africa, Austria, Belgium, Brazil, Denmark, Finland, France, Germany, Hong Kong, Indonesia, Malaya, Netherlands, New Zealand, Norway, Sweden, Switzerland, Dutch Guiana, etc. R. T. International was formed in 1947, and since May 1955 that organisation has been the governing body throughout the world. R. T. International is affiliated to the World Council of Young Men's Service Clubs, and other constituent organisations.

There are over 15,000 members in some 550 Tables in Great Britain and Ireland (1957) and 826 R. T.s throughout the world; over 40,000 members are in some 1400 clubs affiliated to the World Council.

'Round Table,' non-party periodical pub. quarterly in London, founded in 1910 by a group of writers, specialists on imperial and international affairs, and providing a review of current events, especially commonwealth politics.

Round Table, The. The exact origin of the R. T. is uncertain. It appears to derive from the Brythonic or Breton group of the Celtic peoples. It is part of the tradition of the Arthurian romance, in which it is asserted that the knights of King Arthur's court quarrelled for precedence, and that a cunning workman from Cornwall designed a table, round in shape, where all could sit equally. Wace is the earliest recorder of this tradition, and Layamon, who trans. his works, gives a picture of the fight among the knights, and tells us how the great table was built, and that it could seat 1600 knights. In another version Merlin made the table for Uther Pendragon, and another states that it first belonged to the father of Guenevere, King of Cornwall. The earlier legends are connected with that of the Holy Grail, some persons asserting it was built as a copy of the table used at the Last Supper. In the Great Hall at Winchester is a R. T. which was presented to Henry VIII; it was known to have existed in Henry III's reign, and was regarded as a great curiosity; it has seats for the king and 24 knights.

Round Table Conference, name given to a discussion at a round table by groups representing different interests, especially applied to the conferences held in London between 1930 and 1931, which resulted in the Government of India Act, 1935.

Roundels, in heraldry, general term for circular charges of various tinctures. Those coloured gold are called bezants; silver, plates; gules, torteaux; azure, hurts; sable, pellets. Bezants and plates are shown flat, the others spherical. A roundel blazoned barry silver and azure is known as a fountain.

Roundels, or Roundelay, country songs of the 14th cent., so called, from the Fr. *rondelet*, because their words returned to the opening lines again and again; also round dances.

Rounders, Eng. ball game. It became popular in the 18th cent., and at first had only a vague form, on which players grafted their own individual rules. The R. Association of Liverpool and Vicinity and the Scottish R. Association were formed in 1889. Specific rules were fixed. Two teams of 9 play 2 innings each, the bowler delivers the ball underarm to reach the batsman between head and knees, and the batsman scores a rounder by hitting the ball in front of him and running the diamond, outside posts 1, 2, and 3 and touching post 4. He can take sanctuary at any post, but cannot score unless he completes the course at one go. He is out if caught off a fair ball; if he is run out by a fielder, ball in hand, touching a post before he can reach it; if he is touched by a fielder, ball in hand, when running between posts; if he is touched by a fielder, ball in hand, in the batting square after trying to hit a fair ball; if he obstructs a fielder or if 1 foot projects over the front line of the batting square.

Roundheads, nickname for the Parliamentary party during the Eng. Civil war. It appears to have been used first in 1641, during the rioting which took place outside Parliament. It was a term of abuse, referring to the close-cropped hair style affected by some of the extreme sectaries. Misunderstanding has been caused by its application to the whole party. During the 1630s a number of Puritans had declaimed against the exaggerated court fashions: Prynne wrote a number of pamphlets specifically against 'love-locks.' Surviving portraits, however, show little fundamental difference in hair style or costume between prominent Parliamentary and Royalist leaders. Hyde, Pym, Falkland, Hampden, and the Vane had a similar background and shared a common code of manners. Sobriety of dress was adhered to by some of the sectaries, who were frequently of the commercial classes. 'Roundhead' was strictly applicable only to a few enthusiasts; its application to the whole party was an attempt to brand them all as fanatics and upstarts, whereas in fact the Parliamentarians included, as the detailed hist. of the Civil war shows, a variety of types. Contemporary accounts, for example, give vivid pictures of the flamboyant fashions worn by Harrison, the Fifth Monarchist leader, and the gaiety of dress and manners at Cromwell's court at Whitehall caused some comment. Originally used derisively, the word, like 'Puritan,' was generally disliked by the people to whom it was applied. It never seems to have been widely used, and only achieved respectability and fame in 19th-cent. Whig hist. Its use since then has tended to the over-simplification of causes and personalities in a highly complex and fluid struggle. The broad group

Serbati (q.v.) was b. here. Pop. (tn) 13,100; (com.) 23,000.

Rovers, see BOY SCOUTS.

Rovigno, see ROVINJ.

is part of the great N. plain of Italy, and is bounded on the N. by the Adige (q.v.) and on the S. by the Po (q.v.). It has a short coastline on the Adriatic in the E., at the mouth of the Po, where there are numerous small coastal lagoons. The prov. is mainly agric.: livestock, cereals, wine, rice, and fruit are produced. The prin. tns include R., Adria, and Lendinara (q.v.). Area 710 sq. m. Pop. 343,000.

2. (anc. Rhodigium) lt. tn, cap. of the prov. of R., on the Adigetto Canal, 36 m. SW. of Venice (q.v.). It has a 17th-cent. cathedral, sev. other anc. churches, and the remains of a 10th-cent. castle. There are notable collections of paintings in the 2 picture galleries. R. is an agric. centre, and manufs. agric. machinery and leather goods. Pop. 46,000.

Rovinj (It. **Rovigno**), fishing port in Croatia, Yugoslavia, on the W. coast of Istria (q.v.). It has a palace and a 13th-cent. church, and the inhab. are mainly lt. There is a canning industry. Pop. 7500.

Rovno (Ukrainian **Rivne**, Polish **Równe**): 1. Oblast in NW. Ukraine, lying in the Poles'ye lowland in the N. and the Volhynia-Podolia upland in the S., partly covered with pine and oak forests. Area 8000 sq. m.; pop. 921,000, mostly Ukrainians (before the war also Jews, Poles, and Germans). Grain, potatoes, and sugar beet are grown, and there are lumbering, food, and wood-processing industries. R. belonged to Volhynia, became Lithuanian in the 14th cent., Polish in 1569, was Russian 1793-5, and again Polish 1920-39; it was occupied by the Germans in 1918 and 1941-4.

2. Cap. of the above, 110 m. NE. of L'vov. It is a railway junction and local cultural centre. Known since 1282 as a commercial tn on the route Kiev-Poland, it was a Russian fortress in the First World War (battles in both world wars and 1920 Soviet-Polish war). It became prov. cap. in 1939, and was the residence of the German Reich Commissioner for the Ukraine 1941-4. Pop. (1956) 40,000.

Rovuma, riv. (475 m. long) of Tanganyika (E. Africa), with 2 head-streams, the Lujenda and Rovuma, rising E. of Lake Nyasa, and flowing E. to the Indian Ocean. Not navigable, it is the boundary between Tanganyika and Portuguese E. Africa.

Rew, John (c. 1525-80), reformer; won over to Protestantism by Knox's preaching, he was 4 times moderator of the General Assembly, and assisted in drawing up the Scottish Confession.

Rowallan, Thomas Godfrey Polson Corbett, second Baron (1895-), Chief Scout of the Brit. Commonwealth since 1945; b. Gourcock. He joined the Army at 18 on the outbreak of the First World War, serving at Gallipoli, in Egypt and Palestine, and in France. He joined the

Scout movement in 1922. In 1940 he raised and commanded a new battalion of the Royal Scots Fusiliers, training them on Scout lines. After the fall of France in that year he was given command of a Young Soldiers Battalion, consisting of some of the toughest boys imaginable. By applying Scout methods to their training he achieved excellent results. Later he was required to train potential officers, where he again introduced Scout training methods with equal success. He has long been associated with youth activities.

Rowan, see MOUNTAIN ASH.

Rowe, Nicholas (1674-1718), dramatist and poet, b. Little Barford, Beds. He was educ. at Westminster School, and studied law at Middle Temple. He was called to the Bar, but abandoned his profession to become a playwright. His dramatic works were mainly tragedies and include *The Ambitious Step-mother*, 1700, *Tamerlane*, 1702, *Ulysses*, 1706, *The Royal Convert*, 1707, *Jane Shore*, 1714, and *Lady Jane Grey*, 1715. In 1709 he ed. Shakespeare's plays, dividing them into acts and scenes, and inserting stage directions. He also made a trans. of Lucan in 1718. From 1715 he was poet laureate in succession to Nahum Tate. R. enjoyed a tremendous vogue during his lifetime; he possessed a keen sense of the dramatic, a grip of situations, and was a master of pathos.

Rowing. Eight-oared and 4-oared R. originated in England, and was practised principally on the Thames in the 18th cent. At that time it was usually associated with fêtes, galas, and ceremonial occasions. In the early years of the 19th cent. this processional and ceremonial emphasis gave way to the competitive element which culminated in the first Oxford and Cambridge boat race in 1829.

At the present time the practice of R. is world wide, and the most important racing events take their place in the Olympic games which are held every 4 years. The Olympic regatta comprises 7 events: 8-oar; 4-oar with and without coxswain ('cox'); pair-oar with and without cox; and double and single sculls. The European championships, open to the world and including the same events as the Olympics, take place annually on various European courses, while similar championships are held each year in the Americas.

Regattas, held at 4-yearly intervals, are usually included in the programmes of the Empire games, which in recent years have become increasingly popular events in the sporting curriculum. Henley regatta has for long been recognised as the world's most famous regatta; with the exception of intervals created by 2 world wars, it has taken place annually since 1839. The programme includes both open and closed events. There are 4 8-oared challenge cups: the Grand, which is open to the world; the Ladies' Plate, which is confined to schools and colleges; the Thames cup, an open race for second-class crews; and the Princess

Elizabeth cup, which is confined to schools and intended to encourage school boat clubs who do not consider themselves of Ladies' Plate standard. There are 3 4-oared events: the Stewards' challenge cup, with the same qualifications as the Grand, and the Visitors' and Wyfold challenge cups, corresponding to the 8-oared events of the Ladies' Plate and Thames cup respectively. Besides these there are 3 other open events: the Goblets for pair oars, the Double Sculls, and the single or Diamond Sculls. Neither fours nor pairs with coxswains are included in the Henley programme. Other ann. regattas are held at most of the Thames-side tns, such as Marlow, Reading, Staines, Kingston, and Molesey, while great energy and initiative have been shown in the provs. in the organising of a large number of regattas. At such centres as Chester, Newcastle, Edinburgh, Glasgow, Nottingham, York, Bristol, Norwich, Bedford, and Burton-on-Trent, and in the many clubs situated on tide-way waters, R. is practised with enthusiasm and keen competition. Most oarsmen attaining international distinction come from the univs. of Oxford and Cambridge, from Leander, or the prin. Metropolitan clubs, London or Thames.

In Britain the most popular ann. R. event is the Oxford and Cambridge boat race. It is rowed in late Mar. or early April (depending upon a suitable tide) from Putney to Mortlake, a distance of approximately $4\frac{1}{2}$ m. In spite of its many twists and turns this course, except in abnormal conditions, is a very fair one. The start is made on the flood tide, about $1\frac{1}{2}$ hrs before high water at Putney Bridge. The training for this race occupies 12 weeks. Each univ. crew starts practice on their home waters, and after a further period on adjacent waters they move to Putney for the final 3 or 4 weeks. In the first half of this cent. Oxford lost the substantial lead they had held in this series of races and finished the half-cent. 9 victories in arrears. On approximately the same date as the boat race there is held annually the most popular race in the world—the Head of the River Race. This is rowed on the boat-race course from Mortlake to Putney. Each crew starts from and finishes at the same point, and results are judged by an efficient system of electrical timing. Over 200 eights have been known to compete in this gigantic event. This form of competition has been followed up and down the country wherever a suitable course is available.

At Oxford and Cambridge R. is organised on an inter-college basis. The main 8-oared events are bumping races, and all other events are time races. Crews start a certain distance apart and row to finishing-posts the same distance apart, the result being judged on a time basis by signals lowered at the respective finishes. Bumping races are held at both univs. in the Easter and summer terms. At Oxford these are called the 'Torpids' and the 'Summer Eights,' and at Cam-

bridge the 'Lents' and the 'Mays.' The boats, manned by 8 oars, start approximately a length apart at Oxford and a length and a half at Cambridge, and row over the course; the order is decided by the previous year's results. There is racing for 4 nights at Cambridge and 4 nights at Oxford, and a boat touching the one above it precedes it in the following day's racing. Besides these events there are inter-college 4-oared events, and pair-oar and double- and single-sculling trophies.

The world's governing body for amateur R. is the Fédération Internationale des Sociétés d'Aviron, usually abbreviated to F.I.S.A. This body, with its H.Q. in Switzerland, has a code of rules and regulations based on the original Eng. conception of amateur oarsmanship. Each subscribing country sends delegates to its congress each year, which is held at the centre chosen for the European championships. Olympic regattas are held under the auspices of the F.I.S.A. In Great Britain the main governing bodies are the Amateur R. Association (A.R.A.), the Scottish Amateur R. Association, and the Women's Amateur R. Association. The A.R.A. is the association which controls the vast majority of oarsmen in this country. They owe their separate origins to a different conception of what constituted an amateur oarsman. These differences have now been eliminated and a desire has been expressed for an amalgamation of the 2 bodies under the title of the Brit. Amateur R. Association. With the Scottish Association they have already formed a joint committee for the consideration of international R. affairs in so far as they affect Great Britain. See also SCULLING.

See R. P. P. Rowe and C. M. Pitman, *Rowing* (Badminton Library), 1903; S. Fairbairn (ed. B. Cross), *Chats on Rowing*, 1948; G. O. Nickalls and P. C. Mallam, *Rowing*, 1930, 1949; B. C. Fisher, *Rowing and Athletics*, 1948; A. H. Grubb, *Rowing, Sculling, Canoeing, and Punting*, 1949; R. Meldrum, *Rowing and Coaching*, 1950, *Rowing to a Finish*, 1955; I. Fairbairn (ed.), *Steele Fairbairn on Rowing* (containing *Rowing Notes and Secrets of Successful Rowing*), 1951; R. Owen, *Training for Rowing*, 1952; R. D. Burnell, *Swing Together*, 1952, *The Oxford and Cambridge Boat Race*, 1954, and *Sculling*, 1955.

Rowland, Henry Augustus (1848–1901), Amer. physicist, b. Honosdale, Pennsylvania. He graduated from Rensselaer Polytechnic Institute, Troy, in 1870, and was appointed to the chair of physics at the Johns Hopkins Univ. in 1875. Two of his most outstanding achievements were the determination of the value of the ohm, which was more accurate than that previously determined, and his method of making diffraction gratings for use in spectroscopy. In addition, he did valuable work on the mechanical equivalent of heat, applying a number of corrections to the data of Joule's experiments. He also found

that the specific heat of water was not constant, decreasing to a minimum at about 30° C. and then increasing. His pubs. included *Studies on Magnetic Distribution*, 1875, and *On Concave Gratings for Optical Purposes*, 1883.

Rowland, James Peter (1875-1948), meteorologist and astronomer, b. Blackburn, and educ. at Stonyhurst College, and London Univ. He joined the Society of Jesus in 1894. He became assistant director of Stonyhurst College Observatory in 1919 and its director in 1932. He developed the magnetic, meteorological, and seismic work of the observatory until it closed in 1947, and carried out observations on sunspots and the determination of the rotation period of Saturn from the white spot discovered by Huy in 1633.

Rowlandson, Thomas (1756-1827), caricaturist and painter, b. London. He studied art at the Royal Academy schools, visited Paris, and in 1777 settled in London as a portrait painter. Later, after 1781, he inclined towards caricature, and it is in this branch of pictorial art that he did his best work. He satirised society in all its aspects, and his drawings, executed with a pen supplemented with delicate tints of colour, are invaluable as casting a light upon the age in which he lived. He contributed illustrations to Ackerman's *Poetical Magazine*, 1890, to accompany Wm Combe's *Tour of Dr Syntax* (pub. in book form, 1812-21), and illustrated many books, including *The Microcosm of London*, the topographical plates of which were executed by Pugin. His masterpiece 'Vauxhall Gardens' (well-known in the aquatint engraving from it) was rediscovered in 1945, and sold at Christie's for £2730. See studies by J. Grego, 1880; A. P. Oppé, 1923; B. Falk, 1949; and A. Heintzelman, 1950.

Rowley, Samuel (d. c. 1624), Brit. dramatist, was in 1598 associated with Philip Henslowe the theatrical manager, probably as a reviser of other writers' plays; in 1602 he made additions to Marlowe's *Faustus*. He himself wrote sev. plays on biblical subjects, but his only extant piece is *When You See Me You Know Me*, 1605, a chronicle play about Henry VIII. *The Noble Soldier*, a tragedy first printed in 1634, has also been attributed to him, but doubtfully.

Rowley, William (c. 1555-c. 1642), Brit. actor and dramatist, did his best work in collaboration with Middleton (q.v.), with whom he wrote *A Fair Quarrel*, 1617, and *The Changeling*, 1621; he joined with Dekker and Ford (qq.v.) in writing *The Witch of Edmonton*, pub. in 1658. Plays pub. under R.'s own name are *A New Wonder, A Woman Neuer Vexed*, 1632, *All's Lost by Lust*, 1633, *A Match at Midnight*, 1633, and *A Shoemaker's Gentleman*, 1638. *The Birth of Merlin* appeared in 1662 with the names 'William Shakespeare and William Rowley', but the Shakespearean attribution was probably a publisher's publicity device. See C. W. Stork, *William Rowley*, 1910.

Rowley Regis, municipal bor., comprising the tns of Cradley Heath, Old Hill, Blackheath, R. R., and Tividale, in Staffordshire, England, 5 m. W. of Birmingham. There are ironworks and potteries. R. R. forms, with Tipton, a bor. constituency. Pop. 49,400.

Rowne, see ROVNO.

Rowntree, Arthur (1861-1949), scholar and educationalist, b. Scarborough, of Quaker parents, and educ. at Bootham School, London Univ., and Heidelberg Univ. From 1899 until 1927 he was headmaster of Bootham School, which under him became well known. He pub. numerous pamphlets on education, hist., and literature.

Rowntree, Benjamin Seebohm, C.H. (1871-1954), sociologist, b. York, of a prominent Quaker family, and educ. at the Friends' School, and at Owen's College, Manchester. He became a director in his father's chocolate firm and was chairman 1925-41. In his own business affairs he applied many of the social reforms which he advocated in his writings. These include *Poverty, a Study of Town Life*, 1900, *Unemployment*, 1911, *The Human Factor in Business*, 1921, *Poverty and Progress*, 1941, *English Life and Leisure* (with G. R. Laver), 1951, *Poverty and the Welfare State* (with G.R.L.), 1951. He was made a Companion of Honour, 1931.

Rowntree, Joseph (1836-1925), Quaker cocoa manufacturer and philanthropist, b. York. In 1869 he joined his brother Henry Isaac, who in 1862 had taken over the cocoa side of a grocery business begun by Mary Tuke, a Quaker, in 1725. Joseph was left in sole control when his brother d. in 1883, but was later joined by his sons, John Wilhelm and Benjamin Seebohm (q.v.). In 1897 the firm became a limited-liability company with Joseph as chairman. Land on the outskirts of York was bought in 1890, and the first of the present buildings was erected there; since then there have been many extensions; the factory buildings now cover 214 ac., and the factory employs over 10,000 people. In 1901 Joseph bought another estate just beyond the factory, with the intention of creating a vil. community similar to that at Bournville. The Joseph Rowntree Village Trust was formed (in 1904) to put his ideas into practice, and considerable progress was made during his lifetime, after which the work was carried on by Seebohm and others. Joseph was interested in all social problems, in adult education, and the activities of the Society of Friends; and the vil., New Earswick, acted as a focal point for these interests. For the story of the development of New Earswick, see *One Man's Vision*, 1954.

Rowohl, Ernst (1887-), Ger. publisher, b. Bremen. He worked as a compositor in Leipzig and pub. his first book in 1908, soon becoming the publisher of the young expressionist authors Max Brod, Franz Kafka, Arnold Zweig, and Oscar Kokoschka. From 1933 the majority of R.'s pubs. were prohibited by the Nazi

regime, and 5 years later R. escaped to Brazil. In 1946 he refounded his firm, in Hamburg, and was the first Ger. pocket-book publisher after the Second World War, launching a series called 'rororo', of which, since its introduction in 1950, over 25,000,000 copies have been sold.

Rowse, Alfred Leslie (1903-) historian, b. St Austell, Cornwall, and educ. at elementary and secondary schools there and at Christ Church, Oxford. A scholar of very wide scope, his Elizabethan studies are especially notable. Pubs. include *Tudor Cornwall*, 1941, *The Use of History*, 1946, *The England of Elizabeth*, 1950, *The Expansion of Elizabethan England*, 1955, and *The Early Churchills*, 1956.

Rowton Heath, 3 m. SE. of Chester, the scene of a Royalist defeat in Sept. 1645.

Rowton Houses, working men's hotels in London founded in 1892 for bachelor working men. There they can obtain beds in cubicles or separate bedrooms with hot and cold running water, and an inclusive charge covers the use of television rooms, radio, billiards, and a library. There is a first-class canteen. Similar houses have been erected in other parts of England, in various European countries, and the U.S.A., and are projected in India and other Asian countries.

Roxana, daughter of the Bactrian prince Oxyartes. She fell a captive to Alexander, who married her for her beauty (327 BC). After Alexander's death she gave birth to a son (Alexander Aegus), and after a life of persecution and wandering was finally murdered in 311 BC.

Roxburghe, Duke of, see KER, FAMILY OF.

Roxburghe Institute, see BOOK CLUBS.

Roxburghiaceae, see STEMONACEAE.

Roxburghshire, border co. of Scotland, formerly called Teviotdale, bounded N. by Berwickshire, W. by Midlothian, Selkirkshire, and Dumfriesshire, and E. and S. by Northumberland and Cumberland. Its name is derived from the city and castle of Roxburgh (the present vil. of Roxburgh is situated SW. of the site of the castle) which once stood between the Tweed and the Teviot. James II of Scotland was killed by a bursting cannon at the siege of Roxburgh Castle (1460). Among medieval buildings in R. are the ruined abbeys of Kelso, Jedburgh, and Melrose, and there are a number of castles belonging to the border clans. Floors Castle is the seat of the Duke of Roxburgh, who owns much of the land in the co., and Abbotsford (q.v.) was the home of Sir Walter Scott. The surface of the co. is generally hilly, and intersected by well-watered and fertile valleys. The highest peak in the co. is in the Cheviots (Auchopocairn, 2380 ft), which lie on the S. border. The co. is watered by the Tweed, Teviot, and Liddel, with their numerous tribes. Sheep and cattle are pastured on the co.'s grassy slopes. Agriculture flourishes, and other indus-

tries are the manuf. of woollens and tweeds, farm tools, and hosiery; horticulture is also carried on. Jedburgh is the co. tn. and Hawick is an important centre; other tns are Melrose and Kelso. With Selkirkshire and Peebles, R. returns 1 member to Parliament. Area 668 sq. m.; pop. 45,600.

Roxbury, originally a city of Suffolk co., Massachusetts, U.S.A., absorbed in Boston in 1867.

Royal, paper size, see PAPER.

Royal Academy, see ACADEMY.

Royal Academy of Arts, see ACADEMY OF ARTS, ROYAL.

Royal Academy of Music, London, founded 1822, under the direct patronage of King George IV, who granted a royal charter in 1830. The present building in Marylebone Road, with its fine concert hall, was opened in 1911. Fellows and associates are elected by the directors, and honorary members by the committee of management. Tutorial work in all branches of music, speech, and drama, teachers' training courses, and diploma courses are carried on.

Royal Aeronautical Society, founded in Jan. 1866 under the title of the Aeronautical Society of Great Britain for the purpose of increasing by experiments the knowledge of aeronautics. From the first the society concentrated on the possibility of heavier-than-air flight. In 1868 it held the first aeronautical exhibition at the Crystal Palace. The society holds examinations and publishes technical information of direct use to aircraft designers; medals for designing and technical skill are awarded. It has branches in Great Britain and divs. in Australia, New Zealand, and S. Africa. H.Q. of the R.A.S. are at 4 Hamilton Place, London, W.1.

Royal African Colonial Corps of Light Infantry, see WEST AFRICAN FRONTIER FORCE.

Royal Air Force, see AIR FORCE; see also SOVIET AIR FORCE; UNITED STATES AIR FORCE.

Royal Air Force Regiment, see AIR FORCE.

Royal Air Force Volunteer Reserve, see AIR FORCE.

Royal Antelope, see PIGMY ANTELOPE.

Royal Armoured Corps, see ARMoured CORPS.

Royal Army Chaplains Department, see CHAPLAIN.

Royal Army Dental Corps. Dental care did not exist in the Brit. Army until after the S. African war. In 1910 it was realised that wastage of manpower through dental unfitness was too high, and 8 civilian dentists were attached to home commands. In 1914 32 dental surgeons were given R.A.M.C. commissions and attached to the expeditionary force. By 1918 their number had increased to 850. The Dental Corps as such was formed in 1921 and the prefix 'Royal' granted in 1946. The corps now consists of officers who are qualified dental surgeons and other ranks who are orderlies and dental mechanics. They are organ-

ised in static and mobile dental units, and are also attached to field ambulances, where their task is to assist in the treatment of facial and maxillary injuries.

Royal Army Educational Corps, formed in 1920; it was the successor of the Corps of Army School-masters. The honour 'Royal' was granted in 1946. For the work of the Corps, see MILITARY EDUCATION.

Royal Army Medical Corps. Before the Crimean War (1854-6) medical officers and orderlies were 'regimental,' but during the war the Medical Staff Corps was formed. In 1857 this became the Army Hospital Corps (men only), and later was officered from the Army Medical Dept. In 1884 the Army Hospital Corps once more became the Medical Staff Corps, and in 1898 it was amalgamated with the officers of the Medical Dept to form the R.A.M.C. It has the distinction of being the first administrative corps to be granted the title 'Royal.' This corps is responsible for all the medical, surgical, hygienic, and sanitary arrangements of the Army, and its officers act as expert advisers to Commands on all such matters as camp sites, physical training, etc. Its establishment and equipment are so arranged as to meet the varying needs of service in any part of the British Commonwealth. See also MEDICAL SERVICE, ARMY. See P. Lovegrove, *Not Least in the Crusade*, 1951.

Royal Army Ordnance Corps. The Board of Ordnance is one of the oldest depts of the military administration of the Crown, but it did not establish its own factory until 1716. The corps was formed in 1881, primarily as a body of military storekeepers. It became 'Royal' in 1918. In 1942 many of its previous functions were transferred to the Royal Electrical and Mechanical Engineers (q.v.). Its main function is the initial supply of stores and equipment of all kinds to garrisons and expeditionary forces. See Maj.-Gen. A. Forbes, *History of the Army Ordnance Services*, 3 vols., 1929.

Royal Army Pay Corps, formed in 1920 by the amalgamation of the Army Pay Corps and the Army Pay Dept, a corps of officers and men whose duties are divided between command pay offices and regimental pay offices. The former are located with military commands at home and abroad, and their functions are to receive and disburse public moneys in respect of military services, to afford technical advice on questions of pay and allowances, and to 'cost' certain military establs. The regimental pay offices at home are affiliated to record offices, and are responsible for the audit of the pay accounts of soldiers of the regular army, supplementary reserve, and territorial army, and for the payment of reservists and service pensioners.

Royal Army Service Corps. The Corps of Wagoners, formed in 1794, had a short existence, and in 1799 the Royal Wagon Train was formed to perform transport work. This corps went through Well-

ton's campaigns in the Peninsula, was at Waterloo, and was disbanded in 1833. The Land Transport Corps, formed in 1855 during the Crimean War, was the direct forerunner of the R.A.S.C. In 1856 it was merged into the Military Train, and in 1870 became the A.S.C. In 1877 the A.S.C. was divided into 2 branches: (a) the Commissariat and Transport, and (b) the Ordnance Store Branch. In 1880 these branches were formed into separate corps. The Commissariat and Transport Corps (men only) was officered from the Commissariat and Transport Dept. In 1889 the officers and men were amalgamated in the second A.S.C. The corps has a distinguished hist., having been represented in almost every campaign fought by the Brit. Army. During the First World War the corps fulfilled its duties under enormous difficulties, and was a model for all such work. For its services it was granted the title of 'Royal.' As a result of the mechanisation of the army, the Horse Transport companies were disbanded in the thirties. In the Second World War the R.A.S.C.'s maintenance of supplies to the Allies' invading armies in Normandy was a triumph of organisation, particularly after the fall of Caen, when the allied armies advanced rapidly to the Seine and Belgium with ever-lengthening lines of communication. See Sir J. Fortescue and Col. R. H. Beadon, *The Royal Army Service Corps*, 2 vols., 1930-1.

Royal Army Veterinary Corps. In 1796 a permanent veterinary service was estab. in the Brit. Army. It consisted only of veterinary officers under the prin. veterinary officer, but all attached to units. In 1903 the corps was formed and its senior officer designated director general, Army Veterinary Services, with the rank of maj.-gen. In general, its organisation is parallel to that of the R.A.M.C., but as the use of horses and mules by the Army has greatly decreased since its peak in 1918, the R.A.V.C. is now responsible for the supply of remounts and for the procurement and training of all animals in use by the Army. The title 'Royal' was granted in 1918.

Royal Assent, see ASSENT, ROYAL.

Royal Australian Air Force. This was estab. at Point Cook, Victoria, as the Australian Flying Corps, in 1911. It became the R.A.A.F. in 1917. In the First World War squadrons were sent to France and Palestine. Between the 2 world wars considerable expansion took place. The R.A.A.F. distinguished itself in the Second World War, especially in the Far E. campaigns. During the Second World War the R.A.A.F. had a strength of approximately 124,000. Post-war it has served with distinction in Korea and in anti-terrorist operations in Malaya. Its present equipment is built mainly in Australia under licence from Brit. companies. See also AUSTRALIA, *History during the First World War and History during the Second World War*.

Royal Australian Navy. This was estab. in 1909. Previously a R.N.

squadron had been stationed in Australian waters, its cost being shared from 1882 by Great Britain and Australia jointly. It is administered by a naval board under the federal minister of defence. In the Second World War its strength was 20,000. See AUSTRALIA, *History*.

Royal Ballet, The (Sadler's Wells), the national ballet company of Britain, now centred at the Royal Opera House, Covent Garden. Founded as the Vic-Wells Ballet by Ninette de Valois (q.v.) in 1931, the company at first appeared at both the Sadler's Wells and the Old Vic

Michael Somes as the leading dancers, and a *corps de ballet* whose discipline is universally admired, and with an Arts Council grant which permits it to operate on a suitable scale, the R. B. may fairly be compared to advantage with national companies of other countries. As a result of a policy of making regular foreign tours, the R. B. possesses a world-wide reputation. See M. Clarke, *The Sadler's Wells Ballet*, 1955.

Royal Bank of Scotland, The, Scottish bank. Its head office is in Edinburgh. Was incorporated by royal charter in



Barratt's Photo Press

A SCENE FROM 'PETROUCHKA' BY THE ROYAL BALLET COMPANY

Theatres, and by the outbreak of war in 1939 was already estab. at the former theatre as the most important manifestation of Eng. Ballet. The status of the company, renamed the Sadler's Wells Ballet, increased enormously during the war, when a craving for ballet developed in England, and in 1946 the company moved to Covent Garden, a second company (the Sadler's Wells Theatre Ballet) being then formed. The R. B. organisation also includes a school, where general education as well as training in ballet is provided. In Jan. 1957 the title 'Royal' was conferred on both ballet companies and the school. With de Valois, Ashton, and Cranko as its prin. choreographers, a repertory which includes classics from

1727, and commenced business with a capital of £111,000. In 1728 the R. B. of S. made a notable contribution to banking practice by inaugurating the 'cash credit' system. In 1930 the whole capital of Williams Deacon's Bank Ltd. was acquired, and in 1939 the whole capital of Glyn Mills & Co. The R. B. of S. and these 2 banks constitute the 'Three Banks Group,' each bank continuing as a separate entity.

Royal Berkshire Regiment, see BERKSHIRE REGIMENT, THE.

Royal Bounty, item of the civil list, fixed at £13,200 per annum in 1837, from which the Brit. sovereign makes official subscriptions and donations to charities. Subjects whose wives are delivered of 3 or more children at 1 birth received a bounty, paid out of the R. B., until 2 Dec. 1957 when it was discontinued.

Royal Burgh, *see* BURGH.

Royal Canadian Air Force, *see* CANADA, *Defence*.

Royal Canadian Mounted Police, formerly the North West Mounted Police (q.v.). The force was given its present name in 1920, when it was made responsible for enforcing Federal law throughout the whole of Canada. Among its many duties, it is specially empowered to deal with smuggling offences by land, sea, and air; it enforces the provisions of the Excise Act; and it is responsible for the suppression of the traffic in narcotics. It is the sole police force operating in the

George Grove as director. It was incorporated by royal charter on 23 May of the same year. The Associated Board of the R.C.M. and the Royal Academy of Music (q.v.) conducts local examinations from elementary to advanced standard. The present buildings in Kensington were opened in 1894; a concert hall was added in 1901.

Royal College of Organists, London, originally founded in 1864 on the initiative of R. D. Limpus, and incorporated by royal charter in 1893. No tuition is given at the college, but examinations are held in organ-playing and theory of music,



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A CONSTABLE OF THE R.C.M.P.

NW. and Yukon Ters. By separate arrangement with each of the provs except Ontario and Quebec, it enforces provincial laws and the criminal code in rural areas in those provs, as well as in a number of urban centres. The force is administered by the Canadian Minister of Justice, its Commissioner having the rank and status of a Deputy Minister. Its H.Q. is at Ottawa, and its strength, including civilian clerks and reserves, is just under 7000 men. The force is organised in 17 divs., including marine, aviation, and depot divs.

Royal Canadian Navy, *see* CANADA, *Defence*.

Royal Cape Coast Militia, *see* WEST AFRICAN FRONTIER FORCE.

Royal College of Music, London, founded 1883 by the Prince of Wales (later Edward VII), and opened with Sir

and diplomas are granted for associate-ship and fellowship. There are also examinations in choir-training.

Royal College of Physicians, incorporated medical body in London, founded by Thomas Linacre, who with the help of his friend, Cardinal Wolsey, obtained letters patent from Henry VIII in 1518. The object of the College is to guard the profession from men 'who profess physic rather from avarice than in good faith to the damage of credulous people,' and its gov. is vested in the president and fellows only. Linacre was the first president (1518-24). The fellows are elected from the members of the college. The college first held its meetings in Linacre's house in Knight-rider Street, until it moved in 1614 to larger premises in Amen Corner. These were burnt down in the fire of 1666, and new buildings were opened in Warwick

Lane in 1674. The college moved to its present site in Pall Mall in 1825. It grants a licence of L.R.C.P. and a diploma of M.R.C.P. The R. C. of P. of Edinburgh, incorporated in 1681, has combined with the Royal College of Surgeons (Edinburgh) and the faculty of Physicians and Surgeons (Glasgow) in granting a triple qualification by a single examination (L.R.F.P.S.).

Royal College of Science, *see* IMPERIAL COLLEGE.

Royal College of Surgeons. The practice of surgery was in the Middle Ages chiefly in the hands of barbers, and in 1460 a company was incorporated to protect the interests of London barbers who practised as surgeons. In 1511 surgery was restricted by Act of Parliament to persons qualified to practise that art, and a Company of Surgeons arose who amalgamated with the Company of Barbers in 1540. In 1800 was estab. the R. C. of S. of London, which became reconstituted in 1843 as the R. C. of S. of England. The estab. of the General Medical Council in 1858 helped to regularise the 2 professions of physician and surgeon, and the work of the 2 colleges has from that time been co-ordinated. The college grants diplomas of membership (M.R.C.S.), jointly with the licentiatehip of the Royal College of Physicians, L.R.C.P., the 2 together constituting a legal registrable qualification to practise medicine) and of fellowship (F.R.C.S., the hall-mark of the successful surgeon), and a special licentiatehip in dental surgery. In 1948 the degree of F.F.A.R.C.S. (Fellow of the Faculty of Anaesthetics, Royal College of Surgeons) was instituted. The building in Lincoln's Inn Fields, which possesses an excellent museum of anatomical specimens and other material cognate to the work of surgery, based on John Hunter's collection, was badly damaged during the Second World War. The R. C. of S. of Edinburgh was incorporated in 1505, and has buildings in Nicolson Street.

Royal Commission, *see* COMMISSION.

Royal Corps of Military Police, *see* MILITARY POLICE.

Royal Corps of Signals. Up to 1920, when this corps was formed, all arms of the Brit. service except the Royal Artillery communicated by means of the signals service of the Royal Engineers. The R. C. of S. absorbed the Indian Signal Corps in 1927, and was completely mechanised by 1939. All communications between H.Q. above regimental level are handled by detachments of the R. C. of S., whether by dispatch rider, telephone, radio, or teleprinter. *See also* SIGNALS and SIGNALLING, MILITARY. *See* Maj.-Gen. R. G. F. Nalder, *History of British Army Signals in the Second World War*, 1953.

Royal Courts of Justice, *see* JUSTICE.

Royal Dragoon Guards, 4th/7th, *see* DRAGOON GUARDS.

Royal Dragoons, 1st The, oldest line cavalry regiment in the Brit. service; raised in 1661 by the Earl of Peterborough for service at Tangier, and known as

'Tangier Horse' (*see also* QUEEN'S ROYAL REGIMENT). On returning from Tangier in 1684 it was regimented with other dragoons by Col. John Churchill, later the famous Duke of Marlborough. The regiment served under William III in Flanders and Ireland; fought at Dettingen, 1743, where it captured the standard of Fr. Mousquetaires Noirs; and was in the Peninsula, covering the Army's withdrawal on Torres Vedras in 1810. The regiment distinguished itself at Waterloo and captured the Eagle of the 105th Fr. Line Regiment. It formed part of the Heavy Brigade that made the famous charge at Balaklava during the Crimean war. During the First World War the R. D. took part in the Ypres battles from 1914 to the end of the War. The regiment was still horsed in Sept. 1939. It was then part of the army stationed in Egypt and the Middle East, and, as an armoured-car regiment, fought in all the battles from Alamein to Tunis. The R. D. and the Queen's Bays are to be amalgamated by 1959. *See* C. T. Atkinson, *History of the Royal Dragoons, 1661-1934*, 1934.

Royal Dutch Shell, *see under* SHELL TRANSPORT AND TRADING COMPANY.

Royal East Kent Regiment, *see* BUFFS.

Royal Electrical and Mechanical Engineers. The greatly increased use, from 1916 onwards, of internal-combustion engines and electrical gear by the Army was not accompanied by the growth of a central organisation for the repair and overhaul of this equipment in the field. It led to a steady increase in the number of technical N.C.O.s and other ranks, such as fitters, motor mechanics, artificers, and armourers in fighting units for first-line repair work, and apportioning out of this work at rear echelons between the R.E., the R.A.S.C., and the R.A.O.C. (*see* separate articles). In 1942 this service was centralised and a new corps built up by drafts of 'craftsmen' (the lowest rank in the R.E.M.E.) from the specialist corps. To-day the R.A.S.C. retains its own motor repair service, but R.E.M.E. workshops (normally one for each brigade) repair weapons, vehicles, and technical equipment in use for fighting units, which also have attached to them light aid detachments under the command of a W.O.2 from the R.E.M.E.

Royal Empire Society, Brit. organisation founded as the Royal Colonial Institute in 1868 to combat the separatist school, to promote unity of the empire, to increase knowledge and mutual understanding of its many countries and peoples, and to provide a centre in London. The institute received its royal charter of incorporation in 1882, and, by its supplementary charter of 1922, its name was changed to the more comprehensive R. E. S. Its motto is 'United Empire,' and the qualification for membership is Brit. citizenship and an acceptance of the society's objects and policy. The H.Q. building (in Northumberland Avenue, London) contains, besides the library of more than 250,000 books and pamphlets

a bureau of information on matters relating to conditions and prospects in empire territories overseas, a newspaper room with a collection of the press from every part of the empire, an assembly hall, in which are held regular meetings for addresses, discussions, and cinema shows, as well as full Residential Club amenities. The journal of the society is *United Empire*, pub. bi-monthly. Local branches are estab. at Bath, Bournemouth, Bristol, Cambridge, Edinburgh, Hove, Liverpool, and Oxford, and at Adelaide, Auckland, Brisbane, Christchurch (New Zealand), Colombo, Dunedin, Hobart, Jersey, Launceston, Melbourne, Montreal, Ottawa, Perth, Salisbury (Southern Rhodesia), Sydney, and Wellington (New Zealand).

Royal Engineers, see **ENGINEERS**.

Royal Family, term used in Great Britain for the sovereign and members of his or her family. Where the sovereign is a king the first person of the R. F. after the king is the queen, who may be either regnant (when she has the same powers and prerogatives as a king), dowager (i.e. widow of deceased king), or consort. The life and chastity of the queen consort are protected by the Statute of Treasons, 1352. She has her own attorney- and solicitor-general, but though she pays no toll and cannot be amerced (fined) in any court, she is the king's subject, and hence liable to criminal process, and can be guilty of treason against her own husband. She formerly held certain reservations out of the royal demesne lands, and a due called 'queen's gold' payable by any person in return for acts of royal grace extended to him. Apparently it is for the king to decide whether his consort shall be crowned or not; if she is to be crowned the Archbishop of York performs the ceremony, which is, of course, separate from that of the king's coronation. On the king's death she becomes queen-dowager, and is then outside the protection of the Statute of Treasons. But no one can marry her without the licence of the sovereign, and if she marry a subject she does not forfeit her royal dignity. A prince consort has no special privileges apart from those that may be specially granted by statute or letters patent. Both Philip II and William III enjoyed the title of King. Prince Albert was given precedence next to the queen and allowed to attend Privy Council meetings. The life of the king's eldest son is protected by the law of treason. At birth he becomes Duke of Cornwall. When he succeeds to the throne the duchy of Cornwall vests in his eldest son. The king can, if he chooses, and always does, make his eldest son Prince of Wales and Earl of Chester by letters patent; but other titles are *inheritable* by the heir-apparent. The sovereign can control the custody and education of the children of his heir, and the custody of all princes and princesses of the blood royal except the issue of princesses who have married into R. F.s. Both the chastity and life of the Princess of Wales during marriage are protected by the Statute of Treasons.

Princes and princesses of the blood royal take precedence of all peers and public officials (see **PRECEDENCE**). The king, queen, and certain members of the R. F. have a sum awarded to them, called the civil list (q.v.), in consideration of the king assigning to the nation his life interest in the hereditary revenues of the Crown.

Royal Flying Corps was formed on 13 May 1912, and developed out of the Air Battalion of the Royal Engineers formed on 1 April 1911, as the first step in creating a Brit. Army air arm. The air battalion, which was absorbed into the new corps, consisted of 2 companies, one dealing with airships, the other with aeroplanes. Similarly, the R.F.C. was divided into 2 wings (a naval wing and a military wing), and officers who were seconded to the corps retained their existing naval or military rank. The naval wing carried out flying training and experiments with seaplanes and airships, as well as with landplanes, while the military wing concentrated on landplanes only. In July 1914 the naval wing separated from the R.F.C., and became the Royal Naval Air Service, and on 1 April 1918 the R.F.C. and the R.N.A.S. (q.v.) merged to become the Royal Air Force (q.v.). Among the army officers seconded to the R.F.C. on its formation was Maj. Hugh Trenchard, of the Royal Scots Fusiliers (later Marshal of the Royal Air Force Viscount Trenchard), who commanded the corps in France, with the rank of maj.-gen. and who, on the formation of the R.A.F. and the air ministry, became chief of the air staff, and was generally regarded as the 'father' of the R.A.F.

Royal Free Hospital, Gray's Inn Road, London, W.C.1, a general hospital for all type of illnesses and under the National Health Service designated as an undergraduate teaching hospital in association with the R. F. H. School of Medicine, formerly the London School of Medicine for Women. The hospital was originally founded in 1828 by Dr Wm Marsden, and incorporated by royal charter in 1892. The R. F. H. group also includes the Elizabeth Garrett Anderson hospital and the Hampstead General Hospital, as well as the former NW. Fever Hospital and London Fever Hospital.

Royal Fusiliers, The (City of London Regiment), whose hist. dates from 1685, was raised in the time of Monmouth's rebellion. In its early years it was an ordnance corps charged with the duty of protecting the ordnance. Soon after its formation it received the designation of 7th (Royal Fusilier) Regiment of Foot, which title it retained until the territorial reorganisation of the army in 1881, when the name was modified to its present form. Like the Rifle Brigade (q.v.) and a few other regiments, it was one of the few line regiments which had 4 battalions, or more than the customary 2 of the Cardwell linked system. In the First World War the regiment was augmented, comprising, besides many special reserve and service battalions, over 30 affiliated territorial force battalions of the London

Regiment. Like the Rifle Brigade and other large regiments, the R. F. were represented in practically every important battle of the First World War. At Mons the 4th Battalion was conspicuous near Nemy bridge, and again, later in 1914, near Givenchy. In 1915 the service battalions fought with distinction at Hohenzollern Redoubt, while the 2nd Battalion won honour at Suvla Bay in Gallipoli, at Beaucourt, at Ovillers, and especially at Delville Wood, where a number of R. F. battalions were heavily engaged, including the 3rd Public Schools Battalion, which also fought in the Ypres area in 1917. Other battles in which the R. F. took part included Cambrai (Nov. 1917), Bapaume (Aug. 1918), and they also took part in the advance of Gen. Allenby in Palestine in 1918. In the Second World War battalions fought in Europe, 1939-40, Syria, Iraq and the W. Desert, Africa, Italy, and Greece.

Royal Geographical Society, The, was founded in 1830 to advance geographical knowledge by exploration and research. In the 19th cent. it contributed to opening-up Africa by supporting Livingstone, Speke and Grant, Cameron, and others, and revived Brit. interest in the Antarctic, sharing in the organisation of many expeditions from Capt. Scott's to the Trans-Antarctic expedition sent out in 1956 with Commonwealth support. The society also initiated the reform of geographical education in Britain, including estab. of the first univ. school of geography at Oxford in 1899. Two gold medals for outstanding work are awarded annually by her majesty the queen on the recommendation of the council, which also makes grants and awards. The society is supported mainly by subscriptions and donations of fellows; it maintains also a library and a map room, the latter open to the public, and publishes results of original research in the *Geographical Journal* and other pubs. Its address is Kensington Gore, London.

'Royal George', a former British royal sailing yacht (330 tons). The name has been in constant use in the Royal Navy since the reign of Queen Anne, but the best known bearer of it was the ill-fated flagship of Admiral Kempenfelt, which capsized in Portsmouth Harbour and sank with most of the crew on 29 Aug. 1782.

Royal Hampshire Regiment, see HAMPSHIRE REGIMENT.

Royal Highlanders, see BLACK WATCH.

Royal Horse Guards, see HORSE GUARDS.

Royal Hospital, institution in Chelsea for invalid soldiers which was opened in 1694. It is the most notable building of Chelsea, and was built by Wren (1682-92), at the instigation of Charles II., who spent £20,000 on its erection, and settled £5000 a year for its endowment. It stands in extensive grounds, which include the former Ranelagh Gardens, and is built of brick with stone quoins, cornices, door and window dressings, being an excellent example of Wren's power to produce a monumental effect with simple materials.

The hospital accommodates upwards of 500 men, and a system of out-pensioning relieves large numbers throughout the empire. See Capt. C. G. T. Dean, *The Royal Hospital Chelsea*, 1950.

Royal Household, see HOUSEHOLD.

Royal Humane Society, see HUMANE.

Royal Hussars, 10th (Prince of Wales's Own), were raised as dragoons in 1715, but were first in action against the Jacobites in 1745. Served in Germany in the Seven Years War. The Prince of Wales, whose name they bear, was their colonel in 1783 and became George IV. He also conferred the designation 'Royal' in 1811. They took part in the Peninsular campaign of 1808 and embarked at Corunna, having shot all their surviving horses. From 1914 to 1918 they fought on the W. front, mostly dismounted, but at Amiens they made one of the rare cavalry charges of that campaign. Mechanised in 1939, they formed part of the 2nd Armoured Brigade and fought in France, N. Africa, and Italy. See also REGIMENT; HUSSARS.

Royal Hussars, 13/18th (Queen Mary's Own). Both regiments, amalgamated in 1922, were raised as dragoons, the 13th in 1715 and the 18th in 1759. The latter were 'Light Dragoons' from their formation; the former became so in 1783. Both regiments fought in the Peninsula and at Waterloo. The 18th were disbanded in 1821 and re-raised in 1858 as hussars. The 13th were in the Light Brigade at Balaklava. Both regiments went to S. Africa in 1899 and remained in that theatre until 1902, and both were engaged on the W. front in the First World War. In 1916 the 13th was sent to Mesopotamia, where it fought at Kut-al-Amara, Bagdad, and elsewhere. The combined regiments were mechanised in 1939. The regiment fought in France in 1940 and was evacuated from Dunkirk. It took part in the invasion of Normandy and the operations in Belgium and Holland in 1944-5. See also HUSSARS; REGIMENT.

Royal Hussars, 15th/19th King's, The, see KING'S ROYAL HUSSARS.

Royal Inniskilling Dragoon Guards, the 5th, see DRAGOON GUARDS.

Royal Inniskilling Fusiliers, see INNISKILLING FUSILIERS.

Royal Institute of International Affairs, organisation for the study and discussion of international problems, originating at the peace conference held in Paris in 1919 after the First World War. The foundation was originally intended to comprise 2 branches, which have, however, since developed independently, the one into the Council of Foreign Relations in New York, the other into Chatham House, London. Membership, which is confined to Brit. subjects, is by election. Canada, Australia, New Zealand, S. Africa, India, and Pakistan have now all estab. their own institutes of international affairs in close relation with that of Great Britain. Chatham House maintains not only a library of vols. related to its sphere of interest, but also a unique collection

of classified cuttings from the world's press, accumulated since its foundation. The Institute has sponsored individual works which have exercised a decisive influence upon policy, such as Lord Hailey's *An African Survey*, revised ed., 1957 and the *Survey of International Affairs*, pub. annually since 1924. But its most active life is in the frequent addresses, always followed by discussion, in the lecture room in Chatham House. These meetings are private and are for members only.

Royal Institution for the Preservation of Life from Shipwreck, *see* LIFEBOAT.

Royal Institution of Chartered Surveyors, founded 1868, incorporated by Royal Charter 1881, is the chief body representing the profession of surveyor. It holds examinations and confers fellowships (F.R.I.C.S.) and professional associate-ships (A.R.I.C.S.). Members who are qualified as quantity surveyors have exclusive right to call themselves Chartered Quantity Surveyors.

Royal Institution of Great Britain, The, organisation for the 'promotion, diffusion, and extension of science and useful knowledge,' founded in London, 1799, incorporated by royal charter, 1800, and enlarged, 1810. In its laboratories Young, Davy, Faraday, Tyndall, Dewar, and others conducted their researches. The idea of such an institution originated with Benjamin Thompson, Count Rumford (d. 1814), and was carried out with the help of Sir Joseph Banks (d. 1820). It has a fine library, a laboratory, and a museum. Public lectures are given. There are 4 professorships, of natural philosophy, chem., physiology, and astronomy. Ludwig Mond endowed the Davy-Faraday research laboratory in 1896.

Royal Irish Fusiliers, *see* IRISH FUSILIERS.

Royal Irish Hussars, 8th King's. Like the Inniskilling Dragoons, the R.I.H. was raised from Irish Protestants who had fought with William III in 1688-91. They fought in the Sp. campaign under Peterborough (1710). The title 'Royal Irish' was conferred in 1777. The regiment formed part of the Light Brigade at Balaklava, and fought in the S. African War and on the W. front in the First World War. The 4th and the 8th Hussars are to be amalgamated by 1959. *See also* HUSSARS; REGIMENT.

Royal Irish Regiment, *see* IRISH REGIMENT.

Royal Lancers, 12th (Prince of Wales's). This regiment was raised as dragoons for the 1715 rebellion. It was not again in action until 1793. The Duke of Wellington served in the regiment as a lieutenant from 1789 to 1791. During the Napoleonic wars it served in Egypt, the Peninsula, and at Waterloo, which is its earliest battle honour. It was part of the Light Brigade at Balaklava, and fought in the S. African war and on the W. front in 1914. With the 11th Hussars it was the first cavalry regiment to be converted to armoured cars (1928). They went to France in 1939 and to the W. desert in

1941. They fought throughout the N. African campaign and in Italy in 1944 and 1945. *See also* LANCERS; REGIMENT. *See* P. F. Stewart, *History of the XII Royal Lancers*, 1950.

Royal Leicestershire Regiment, *see* LEICESTERSHIRE REGIMENT.

Royal Lincolnshire Regiment, *see* LINCOLNSHIRE REGIMENT.

Royal Mail Lines Ltd., incorporated as the Royal Mail Steam Packet Company in 1839 by royal charter to carry mails to the W. Indies, and entered into the first contract with the gov. in 1841. The company was also the first to institute mail communication with S. America in 1851. In 1909 the Forward line was purchased, and in 1910 the whole of the share capital of the Pacific Steam Navigation Company. Under reorganisation in 1932 the fleets of the Nelson Steam Navigation Company and David MacIver & Co. Ltd. were transferred to the Royal Mail Company. The main services are to S. America, Central America and W. Indies, and N. Pacific coast.

Royal Marines, *see* MARINES.

Royal Marriages. By the Royal Marriage Act, 1772, which was passed by reason of the marriage of the then Duke of Cumberland to Mrs Horton, and of the Duke of Gloucester to Lady Waldegrave, no descendant of George II other than the issue of princesses who have married into foreign families may lawfully marry without the consent of the sovereign signified under the great seal and declared in council. Marriages contracted without such consent are void wherever contracted or solemnised, and any person solemnising or consenting to such marriages incurs the penalties of praemunire (which penalties now involve no more than inability to sue for any private injury). It seems, however, that a descendant of George II over 25 years of age may marry without the royal consent on giving 12 months' notice to the Privy Council, provided Parliament in the interim makes no objection. *See also* MORGANATIC MARRIAGE.

Royal Military Academy, *see* SANDHURST; MILITARY EDUCATION.

Royal Mint, *see* MINT.

Royal Monmouth Royal Engineers (Militia), the only representative in the Brit. Army today of the historic militia force (*see* MILITIA). Originally an infantry regiment, it became an engineer unit in 1877. It was one of the 4 co. militia regiments which maintained a separate existence when the Militia was absorbed in the Special Reserve in 1908. When the rest of the Special Reserve was discontinued after 1921 it survived as a Supplementary Reserve unit. It was incorporated in the Territorial Army in 1953, but was allowed to retain the word Militia in its title. *See* history by B. E. Sargeant, 1910.

Royal National Lifeboat Institution, *see* LIFEBOATS.

Royal Naval Air Service, developed out of the naval wing of the Royal Flying Corps and came into being on 1 July

1914. Its prin. duties were : atrolling sea routes and attacking Zeppel sheds, and particular exploits includ- the destruction of 2 Zeppelins at Düsseldorf and Friedrichshafen (1914), the sinking of 3 ships in the Dardanelles by torpedoes launched from seaplanes, offensives against enemy bases in Belgium, further successful attacks on Zeppelins and sheds, bombing raids on Pola, Cattaro, Durazzo, and Constantinople. It also performed valuable anti-submarine work, and in addition operated scout airships, 15 armoured-car squadrons, and 3 armoured trains. By 1918 it possessed 2949 aircraft and 90 airships. The R.N.A.S. was amalgamated with the R.F.C. to form the R.A.F. on 1 April 1918, and was revived as the Fleet Air Arm (q.v.) in 1924.

Royal Naval College, see NAVAL EDUCATION.

Royal Naval Division, formed in Aug. 1914, consisting of 1 R.M. and 2 R.N. brigades of approximately 3500 men each. Later were included R.N.R., R.F.R., and R.N.V.R. personnel for whom no ships were available. Originally it was intended to assist home defence in the early stages. The div. saw service in the defence of Antwerp (1914), Gallipoli (1915-16), and on the W. front (1916-18), and distinguished itself for tenacity and courage at Beaucourt (Nov. 1916), Gavrelle (April 1917), Passchendaele (Oct. 1917), in the Ger. offensive of Mar. 1918, and in the subsequent allied advance. While in France it was brought up to strength mainly by recruits from army sources. The R. N. D. suffered 32,631 casualties. It was disbanded in 1919.

Royal Naval Minewatching Service is a volunteer civilian organisation which is open to men and women and administered by the R.N. It was estab. in Jan. 1952, and is formed on a basis similar to that of Civil Defence. Its war-time task would be to observe the fall of mines dropped by enemy aircraft in harbours and coastal waters (see MINES, MILITARY AND NAVAL) and to report their positions to local Naval H.Q., so that shipping could be warned and steps taken to destroy the mines.

Royal Naval Reserves, see NAVAL RESERVES.

Royal Naval Scientific Service, see NAVAL SCIENTIFIC SERVICE.

Royal Navy, see NAVY AND NAVIES.

Royal New Zealand Air Force. This was estab. in 1926, its foundation being 2 squadrons of fighter planes lent by the R.A.F. During the Second World War it reached a peak enlistment of 52,000. Its squadrons served on all major fronts. It is controlled by an Air Board under the chairmanship of the minister of defence.

Royal New Zealand Navy. Unit formed in 1941. Previously a R.N. squadron had been stationed in New Zealand waters, its cost being shared by the Brit. and New Zealand Govs. See NEW ZEALAND, Defence.

Royal Niger Constabulary, see AFRICAN FRONTIER FORCE.

Royal Norfolk Regiment, see NORFOLK REGIMENT.

Royal Northumberland Fusiliers, see NORTHUMBERLAND FUSILIERS.

Royal Numismatic Society. Founded in 1836 as the Numismatic Society of London, the society was granted its royal charter in 1904 for the study of all branches of coins and medals (see NUMISMATICS; MEDALS), and now applies itself with equal emphasis to the Gk, Rom., Eng., Brit. imperial, continental, and oriental series. In 1836 the *Numismatic Journal* was first pub.; in 1838 this was renamed the *Numismatic Chronicle*, which has been in pub. ever since. The society meets monthly in London during its season for the transaction of its business and to hear papers read by its fellows. Fellowship is open to all with good amateur interest in numismatics. An ann. silver medal is awarded for work of outstanding merit at home or abroad. Address: Brit. Museum.

Royal Oak, city in Oakland co., SE. Michigan, residential suburb NNW. of Detroit. It manufs. tools, abrasives, paint, mattresses, cushions, scales, and building products. Detroit Zoological Park is here. Pop. 46,808.

Royal Observer Corps, see OBSERVER CORPS.

Royal Opera House, London, see COVENT GARDEN THEATRE.

Royal Physical Society of Edinburgh, instituted in 1771 and incorporated in 1788. It is exclusively devoted to natural hist. and allied sciences. With it were merged a number of other societies, such as the Chirurgo-medical, Hibornian Medical, Chemical, Natural History, and Didactic, all between 1796 and 1913. The society's first *Proceedings* were issued in 1858.

Royal Pioneer Corps, see PIONEER CORPS.

Royal Regiment, see ROYAL SCOTS.

Royal Regiment of Artillery. A permanent corps of gunners to garrison the defences of the country was first formed in the reign of Henry VIII. From these temporary 'trains of artillery' were formed in war-time for service in the field. The first permanent units for service in the field were estab. in 1716, and it is from those that the R. R. of A. dates its origin. During the course of the 18th cent. the R. R. of A. took over the responsibility for all artillery duties, both field and garrison, and the old corps of gunners mentioned above went out of existence. The Royal Irish Artillery was absorbed in 1801, and the East India Company's Horse Artillery after 1860.

The R. R. of A. was at first organised in companies, later known as batteries. Batteries were grouped in brigades until 1938, when the tactical unit became the regiment. Until after the First World War units were designated -th Battery, Royal Field Artillery, or Royal Garrison Artillery. Now the whole regiment is divided into branches: Field, Anti-Tank, and Anti-Aircraft. To the first belong the Royal Horse Artillery and the

Honourable Artillery Comd

In 1957 a R.A. Guided

was formed—a unit which has a parallel in the Rocket Troop of the Napoleonic Wars. See also ARTILLERY.

Royal Sanitary Institute, see ROYAL SOCIETY OF HEALTH.

Royal School for Daughters of Officers of the Army, founded in Bath in 1864 for daughters or grand-daughters of officers who have held permanent regular commissions in the Army, the Royal Marines, or as chaplains. Daughters of former pupils are also admitted.

Royal Scots, The, The Royal Regiment, senior line regiment of the Brit. Army and possibly the only surviving regiment in any European army having a direct connection with the professional companies, as opposed to feudal levies, of the late Middle Ages. From the early 15th cent. the Fr. kings maintained large numbers of Scottish troops, and their number was greatly augmented under Henry IV. When in 1633 Charles I of England and Scotland decided to intervene in the Thirty Years War he granted a warrant to Sir John Hepburn to raise men in Scotland for a regiment to be formed round a cadre drawn from the Scottish regiments still in the service of the Fr. Crown. Hepburn claimed precedence for the regiment, and one of the senior Fr. regiments named it 'Pontius Pilate's Bodyguard.' After the death of Gustavus Adolphus the Scottish regiments in the Swedish service were disbanded and those members of the 13 Swedish-Scottish regiments who did not take service under sundry Ger. Protestant sovereigns joined Hepburn's colours. This brought the regiment up to a strength of over 3000, or about 3 times the size of a normal regiment of those days (1635). The regiment was first taken into Eng. service in 1661, and it is on this date that its seniority as the first regiment of the line is based.

The title of Royal Regiment of Foot was conferred upon it in 1684 for services in Tangier, Dixmude, Oudenarde, and Ypres in the 16th cent. are among the historic sieges in which it took part. Its battle honours before the First World War include also Ava, the Crimean battles, Peking (1860), Taku Forts, and the S. African war (1899-1902). In the 1914-18 war 38 battalions served: the 2nd Battalion was at Mons and Le Cateau in 1914. Six battalions took part in the Somme and Amiens battles in 1916. Other battalions fought in the Brit. advance into Palestine in 1917 and against the final Ger. offensive in 1918. In the Second World War the 1st Battalion went to the W. front in 1939 and distinguished itself in the rearguard fighting across France, the remnants being evacuated at Dunkirk. Other units, including the Lothians and Border Horse, a yeomanry regiment which was converted into a R. S. battalion, fought on the It. front, in the battle of Normandy, and in the advance to and across the Rhine. The 1st Battalion sailed in 1942 for India.

In Burma it was flown into Kohima to assist in repelling the Jap. advance in Assam. It incurred serious losses, but later crossed the Chindwin R. at Kalewa and moved on through Shwebo to the Irrawaddy R. and on to the siege of Mandalay. See J. O. Leask and Capt. H. M. McCance, *The Regimental Records of The Royal Scots*, 1915.

Royal Scots Greys, see SCOTS GREYS, ROYAL.

Royal Society (R. S. of London for Promoting Natural Knowledge), oldest scientific society in Great Britain, and one of the oldest in Europe. The nucleus of the society came into existence about 1645 (the first jour. is recorded in Nov. 1680) and in 1662 Charles II, who had previously become a patron, granted the first charter. Subsequent charters in 1663 and 1669 conferred further privileges on the society, a group of enthusiasts for the new experimental philosophy who from the start excluded political and religious topics from their weekly meetings. Amongst the first fellows were John Wilkins, afterwards Bishop of Chester; John Evelyn the diarist; and Robert Boyle; later Seth Ward, afterwards Bishop of Salisbury, and Sir Christopher Wren joined them. Pepys was made a fellow in 1664. Wren was one of the society's earliest presidents. Newton was elected a fellow in 1671, and in 1687 his *Principia* was pub. with the encouragement of the R. S.; he served as president from 1703 until his death in 1727. He was succeeded by Sir Hans Sloane, whose collections formed the nucleus of the Brit. Museum. In 1848 control of the society passed wholly into the hands of men of science, and election to its fellowship became a recognition of their high achievement. Scientific papers are read at meetings and subsequently pub. in the *Proceedings* (dating back to 1800) or the *Philosophical Transactions* (which began in 1666) of the society. The administration of an annually varying sum of money granted by the gov. to promote scientific research is in the society's hands; it also awards annually the Copley, 2 Royal, the Davy, and the Hughes medals, the Rumford and Darwin medals every second year, the Sylvester medal every third, and the Buchanan medal every fifth year. The number of fellows of the R. S. is 580, and there are 60 foreign members. See also C. R. Weld, *A History of the Royal Society*, 1843; and Sir H. Lyons, *The Royal Society*, 1944.

Royal Society for the Prevention of Accidents, see ROAD SAFETY.

Royal Society for the Protection of Birds, founded in 1889 and incorporated under royal charter in 1904. The society is the national body responsible for the conservation of Brit. birds, more especially the rarer species. It maintains active liaison with regional bodies. It owns or administers a number of sanctuaries, such as Grassholm, Minsmere, and Haver-gate Is. It also employs a chain of paid watchers from Cornwall to Shetland.

The society is also actively engaged in educating the younger generation into a fuller appreciation of the value of wild life. The Junior Bird Recorders' Club, formed by the society in 1943 to cater for young bird-watchers, now numbers over 2000 members. The society publishes a quarterly magazine, *Bird Notes*, and booklets and leaflets. Membership of the society is open to all persons in sympathy with its aims.

Royal Society of Arts (Royal Society for the Encouragement of Arts, Manufs. and Commerce), learned society founded in London in 1754. Its scope includes all the practical arts and sciences, and the membership is 6200 fellows. The chief regular activities are the delivery of lectures (afterwards pub. in a fortnightly journal) on a wide range of subjects, and the conduct of a large system of commercial examinations; but the society's hist. includes many pioneering efforts, such as the first Eng. exhibition of contemporary art (1760), which resulted in the foundation of the Royal Academy, the first Industrial exhibition (1761), the inauguration of the first international exhibition (1851), and the foundation of the National Training School for Music (1870). In the 18th cent. far-reaching results were achieved in agriculture, forestry, and mechanical invention, both in Britain and the colonies, by the award of prizes. The society's chief special interest is industrial design, which it fosters by exhibitions (such as the Exhibition of Brit. Art in Industry, 1935, held jointly with the Royal Academy), competitions, and the award of the distinction of Royal Designer for Industry (R.D.I.) to eminent designers. The patron is Her Majesty the Queen, and the president is H.R.H. the Duke of Edinburgh.

Royal Society of Edinburgh (founded 1783), Scottish learned society, arose from the Philosophical Society of Edinburgh, founded in 1731. It received a charter in 1783 and a second in 1811. The society was instituted 'for the promotion of science and literature,' but deals now almost wholly with science. The society has pub. its *Transactions* since 1783, and its *Proceedings* since 1832.

Royal Society of Health (formerly Royal Sanitary Institute), founded in 1876. Its object is to promote the advancement of sanitary science in all or any of its branches, and the diffusion of knowledge relating thereto. It has a membership of over 8000, which includes members of the medical, engineering, architectural, veterinary, legal, and other professions associated with public health. It holds an annual congress together with meetings of the various sections.

Royal Succession, see SETTLEMENT, ACTS OF AND SUCCESSION, ROYAL.

Royal Sussex Regiment, see SUSSEX REGIMENT.

Royal Tank Regiment. The first Brit. tank crews were known, for security reasons, as the Heavy Branch, Machine Gun Corps, and in 1917 became the Tank

Corps, in 1923 the Royal Tank Corps, and in 1939 the Royal Tank Regiment (see also ARMOURD CORPS, ROYAL). Within the R.A.C. sev. regiments of the R. T. R. survive as distinct from converted cavalry regiments. Generally speaking, the tradition of heavy 'infantry' tanks remains with the R. T. R., and its units are commonly found in army tank brigades rather than in the armoured brigades of armoured divs. (see also TANKS).

Royal Ulster Constabulary, police force of N. Ireland. In 1787 the first police force in Ireland was formed under warrant of the lord lieutenant. Co. grand juries were authorised to appoint a chief constable to each barony, and were given power to enrol 16 sub-constables to assist each chief constable. In 1822, under an Act of imperial Parliament in the reign of George IV, a permanent trained police force was set up for the whole of Ireland, commanded by 4 inspector-generals, 1 for each prov. In 1836 control of the 4 prov. forces was centralised under 1 inspector-general with H.Q. in Dublin. In 1867 Queen Victoria granted to the force the title of the Royal Irish Constabulary. That force remained in being until disbanded under the Constabulary of Ireland Act, 1922, following the div. of the country into N. Ireland and S. Ireland (Eire). The R. U. C. came into being on 1 June 1922, under a Constabulary Act passed by the first Parliament of N. Ireland. Approximately one-half of the original estab. were members of the Royal Irish Constabulary, who transferred to the new force on disbandment. The R. U. C. has a maximum strength of 3000, and is commanded by an inspector-general, assisted by a deputy inspector-general, with H.Q. in Waring Street, Belfast. The regular police force is assisted by a part-time voluntary force of special constables, known as the Ulster Special Constabulary.

Royal Ulster Rifles, see ULSTER RIFLES.

Royal United Service Institution, Whitehall, London, for the study and recording of the military and naval arts, was founded in 1831 by William IV as the Naval and Military Library and Museum, and originally housed in Vanbrugh House, Whitehall Yard. In 1859 it was granted a royal charter, and in 1895 moved to its present quarters in the Banqueting House (see WHITEHALL). The museum of the institution illustrates military and naval history and science, and contains important relics and records of war.

Royal Warwickshire Regiment, see WARWICKSHIRE REGIMENT.

Royal Water Lily, see VICTORIA AMAZONICA.

Royal West African Frontier Force, see WEST AFRICAN FRONTIER FORCE.

Royal Welch Fusiliers, see WELCH FUSILIERS.

Royalists, term frequently used of monarchist parties. In England it is applied especially to the party which supported Charles I and, after 1649, Charles II, during the civil wars. The R. appear

as a distinct group in Parliament during the 'Root and Branch' debates on episcopacy in the House of Commons in 1641. A strong minority emerged who, though generally opposed to Arminianism, were also opposed to the eradication of episcopacy from Anglicanism. As the war progressed it was obvious that the R. were strongest in the NW., and the Parliamentarians in the SE., though there were sev. exceptions to this, such as Royalist Colchester in the SE., and Parliamentarian Gloucester in the W. R. were drawn from all classes, though their steadiest support came from the lesser squiarchy. They embraced a wide range of religious opinions: Catholics and Arminians were universally Royalist, but the party included moderate Anglicans, and, after 1649, many Presbyterians and some of the sectaries. This diverse group was, in fact, welded together by its allegiance to the king alone. One of the best explanations as to what constituted a Royalist was given by Sir Edmund Verney, who fell carrying the royal standard at Newbury. On the constitutional questions and the episcopacy issue his sympathies were really with the Parliamentarians. He supported Charles I., however, for he declared that, having enjoyed the king's favour and kindness for many years, he could not be so base as to desert him now. See E. Hyde, Lord Clarendon, *State Papers*, 1621 onwards; Lord Clarendon, *History of the Rebellion and Civil Wars in England*, 1702-4; G. Burnet, *History of his Own Time*, 1723, 1734 (ed. O. Airy, 1897-1900); *Verney Papers*, ed. by Frances P. and Margaret M. Verney, 1892-9; W. A. Shaw, *History of the English Church during the Civil War*, 1900; G. Davies, *The Early Stuarts*, 1937; D. Mathew, *Social Structure in Caroline England*, 1948; and C. V. Wedgwood, *The King's Peace*, 1955. See also CIVIL WAR.

Royalty. Popularly R. is synonymous with monarchy or sovereignty, and a king is styled monarch or sovereign although he may possess no more than a portion of the sovereign power in a state. R. properly denotes the status of a person of royal rank, such as a king, queen, reigning prince, or grand duke, or any of their kindred. But the possession of such status is in no way expressive either of the actual or *de jure* political powers with which the possessor may be invested. The powers possessed by persons of royal dignity have varied from the performance of purely honorary functions to the exercise of the most absolute autocracy. See also CROWN; SOVEREIGNTY.

Royan, Fr. tn in Charente-Maritime dept., at the mouth of the Gironde. Formerly a popular resort, it was virtually destroyed by Allied bomber attacks on the Ger. garrison (Jan.-April 1945) in the Second World War. Pop. 6100.

Royat, Fr. spa in the dept of Puy-de-Dôme. It was known to the Romans, and has a remarkable fortified Romanesque church. There are chocolate and jewel-cutting industries. Pop. 3400.

Royce, Frederick Henry, see ROLLS-ROYCE LTD.

Royce, Josiah (1855-1916), Amer. philosopher, b. Grass Valley, California, U.S.A. He graduated from the Univ. of California, and studied philosophy in Leipzig and Göttingen Univs. He held the chair of philosophy at his own univ., and then became a prof. at Harvard in 1892. As such he estab. himself as one of the foremost Amer. philosophers, influenced by Hegel in his objective idealism. His books include *Spirit of Modern Philosophy*, 1892, *The Conception of God*, 1895, and *The Conception of Immortality*, 1900.

Royde-Smith, Naomi Gwladys (-) novelist, b. Llanwrst, Wales. The family moved to London, and she was educ. at Clapham High School and Geneva. From 1912 to 1922 she was literary editor of the *Westminster Gazette*, and in 1926 she married Ernest Milton, a well-known actor. Her novels include *The Tortoiseshell Cat*, 1925, *The Housemaid*, 1926, *Children in the Wood*, 1928, *Summer Holiday*, 1929, *The Delicate Situation*, 1931, *The Bridge*, 1932, *Pilgrim from Paddington*, 1933, *All Star Cast*, 1936, *Miss Bendix*, 1938, *The Unfaithful Wife*, 1941, *Mildense*, 1943, *Love in Mildense*, 1948, and *She Always Caught the Post*, 1953. *A Balcony*, 1926, and *Private Room*, 1934, are plays, and she also wrote studies of Julie de Lespinasse, 1931, and Mrs Siddons, 1933.

Royden, Agnes Maude (1876-1956), preacher and social worker, b. Birkenhead; educ. at Cheltenham Ladies' College and Lady Margaret Hall, Oxford. She did social work in Liverpool and elsewhere and worked for the women's suffrage movement. Though an Anglican, she was assistant minister of the City Temple from 1917 to 1920. With Percy Dearmer she founded the Fellowship Services at Kensington. Her pubs. include *Prayer as a Force*, 1922, *The Church and Woman*, 1924, and *I Believe in God*, 1927. She pub. her autobiography, *The Threefold Cord*, in 1947. She was created C.H. in 1930.

Royer-Collard, Pierre Paul (1763-1845), Fr. philosopher and statesman, b. Sompuis, Marne. He was a member of the municipal council of Paris at the beginning of the revolution, fled from Paris during the Reign of Terror, and served on the Council of Five Hundred for a short time in 1797. In 1811 he was created prof. of philosophy at Paris, teaching the doctrines of Reid and Stewart and originating the *doctrinaire* school, which included among its disciples Jouffroy, Guizot, Camille Jordan, P. F. H. de Serre, De Rémusat, Cousin, etc. He was president of the Chamber of Representatives in 1828, presenting the address in 1830, which the king refused to hear. See *Life* by Barante, 1878.

Royston, mkt tn and urb. dist. in Hertfordshire, England, 13 m. SSW. of Cambridge, situated on the pre-Rom. Icknield Way. There is a 13th-cent. church. A curiosity is the R. Cave (near the post office), discovered in 1742; it dates from

pre-Christian times, and was a Rom. sepulchre and an oratory. It is dug out of the chalk (height 25 ft and diameter 17 ft) and contains rough figures and coloured reliefs of saints, kings, and queens of various dates, most of which were made about the time of the crusades. Therfield Heath, to the SW. of the tn, is a rolling heathland of 416 ac. open to the public: here golf and other games are played. Hunting and coursing take place in the season. Pop. 4820.

Royton, tn in Lancs, England, 2 m. N. of Oldham. It is engaged in cotton spinning. Pop. 14,800.

Rozanov, Vasil'y Vasil'evich (1856-1919), Russian philosopher and publicist, wrote many brilliant and often paradoxical essays criticising contemporary theories of knowledge, morals, education, philosophy of history, and aesthetics from a standpoint similar to Nietzsche's. R. first used the simile of the 'Iron Curtain' later given currency by Sir Winston Churchill. See his *Solitaria*, 1927, and *Fallen Leaves*, 1929.

R.S.F.S.R., see RUSSIAN SOVIET FEDERATIVE SOCIALIST REPUBLIC; RUSSIA.

Ruabon, or Rhiwabon, tn in Denbighshire, Wales, 5 m. SSW. of Wrexham. Coal and iron are found here, and there are brick and chemical works. Pop. 4000.

Ruanda, the people of the Kingdom of Ruanda, in the Belgian mandate of Ruanda-Urundi. The king, or *Mwami*, is the head of the Tutsi state, composed of non-Negro Hamitic immigrants who have conquered indigenous Bantu Negroes known as *Hera*. The Tutsi have an elaborate cult based on cattle keeping, with sacred herds of cattle, and are famed for their beautiful and spectacular dancing and art. See R. Bourgeois, *Banyaruanda et Barundi*, 1954.

Ruanda-Urundi, dist. of the Belgian Congo, assigned to Belgium as a mandatory of the League of Nations. In Dec. 1946 the United Nations approved a trusteeship agreement which became operative in April 1949. R.-U. lies E. of Mt Kivu, and is bounded N. by Uganda and E. by Tanganyika Ter. It formed until 1919 a part of Ger. E. Africa. It was united administratively with the Belgian Congo in 1925. It is a mountainous area, volcanic in the N., and is rich in cattle. Usumbura is the cap. The dist. covers 20,900 sq. m. and has a pop. of 4,071,702, belonging to the Batutsi, Bahutu, and Batwa tribes; others (white) 5306; (Asiatics) 2175.

Ruaspehu, intermittently active volcano (c. 9100 ft high) in N. Is., New Zealand.

Ruatan, see ROATAN.

Rusault, Jean (c. 1580-1636), Fr. classical scholar, b. Contances. In 1629 he was ed prof. of belles-lettres at the Collège Royal, and on 2 separate occasions was chosen rector of the university at Paris. His chief publication was an edition of Plutarch, 1624.

Ruba'i (pl. Ruba'iyyat), or Quatrain, used by Persian, Arab, and Turkish

poets, consisting of 4 hemistichs complete in themselves. Fitzgerald's translations of the quatrains of Omar Khayyam (q.v.) have made this verse form familiar.

Rubasse, mineral consisting of quartz or rock-crystal, containing minute particles of red oxide of iron. The stone is valued for ornamental uses and is very rare. An artificial variety is prepared by plunging red-hot quartz into a coloured liquid.

Rubber (Indiarubber, Caoutchouc). R. latex is the milk-like juice which is contained in numerous species of trees, shrubs, and plants, and consists of R. hydrocarbon, together with varying amounts of other substances, depending on source, in a dispersion in water. This latex can be coagulated and dried in various ways to give the raw R. of commerce. It is called R. because one of its earliest uses in Europe was erasing pencil marks, and India from 'India', the old Sp. name for S. America; caoutchouc is derived from the Caribbean word *cahucho*. It is said that Columbus found the natives of Haiti playing with a ball 'made of the gum of a tree,' that was lighter and bounced better than any known at home.

Before the beginning of the *Hevea brasiliensis* R. plantation industry, and during the Second World War, very large amounts of R. were extracted from many different sources, both in plantations and in a wild state in jungles. The most important source was trees: *Funtumia guayule*, which occurs in Ghana and other parts of Africa; *Landolphia* vines of sev. species, which occur in many parts of Africa; *Manihot* from the Ceara prov. of Brazil, and some others, as well as the *H. brasiliensis* from the Amazon dist. of Brazil. The prin. shrub was the *guayule*, which grows principally in Mexico, but which has also been grown in plantations in the U.S.A. Various plants, including the common dandelion, also contain small amounts of R. latex, and the *kok-saghyz* or Russian dandelion was grown in the U.S.S.R., and experimentally in the U.S.A., during the Second World War for its R. content.

Nowadays the chief source of R. is the *H. brasiliensis* tree, grown on plantations (both large European-managed estates and native smallholdings) in Malaya, Ceylon, Indonesia, and other places in the Far E. These supplied 95 per cent of all natural R. produced in 1953. The R. produced from other sources, though chemically identical, suffers from sev. disadvantages, e.g. the tree must be felled to extract the latex; the latex exists in systems which contain a high percentage of resin, which contaminates the R. when coagulated; or the R. is produced under native conditions and is contaminated with grit, bark, and water, as is the case with all wild R.s. In the case of *guayule* the whole plant, minus the roots, and in the case of *kok-saghyz* the roots, have to be treated by mechanical means in order to extract the R. from the plant tissue. In the case of *H. brasiliensis* (and some other trees) the latex is mainly contained in special

tubes in the bark and can be obtained by tapping the tree, i.e. making an incision in the bark, whence a small quantity of latex flows.

HISTORY OF COMMERCIAL RUBBER-GROWING. Although known in S. America from early times and mentioned in writings by Sp. travellers in the 16th cent., R. did not begin to reach Europe and the U.S.A. in quantity until the early 19th cent., coming at first solely from the Amazonas prov. of Brazil. Brazil exported 31 tons in 1837, and 2378 tons in 1853, in which latter year 247 tons were also produced by other countries. All this was 'wild' R., obtained from trees in jungles. Wild R. continued to be a major source of supply until about 1916, when it accounted for some 33 per cent (54,000 tons). The total amount of R. produced has risen enormously, e.g. in 1953 world production was 1,725,000 tons.



RUBBER: TAPPING

The latex, in spite of minor coagulation on the external bark of the tree, runs down in the form of drops into the cup below. Each dot on the tapped portion represents one month's tapping.

The amount used and the price of R. have varied very considerably over the last 20 years.

The plantation R. industry was effectively begun in 1876, when Sir Henry Wickham collected seeds of *H. brasiliensis* from the Tapajós-Madeira plateau in Brazil. The seed was not smuggled out as is often suggested, but was obtained by the goodwill and co-operation of the Brazilian Gov. These seeds produced 2700 plants at Kew Gardens in London,

of which 1919 were transferred to Ceylon in 1876; all the R. trees on the vast plantations in Asia sprang from these. Once the advantages of growing R. on plantations were recognised, other species of trees were tried, both in the Far E. and in Africa, but for sev. reasons the *H. brasiliensis* was found to be best, and Ceylon, Malaya, and the Dutch E. Indies, and to a much lesser extent other places in the Far E. and Africa, the most suitable places for growing it. They were more suitable even than the Amazon dist. of Brazil, where plantations of *H. brasiliensis* were estab. but where the trees were attacked and large numbers destroyed by a leaf disease.

The species can be raised from seed, but bud-grafting on to a young seedling is equally popular. The buds are taken from selected high-yielding trees, and in this way the characteristics of the 'mother tree' can be transmitted to an almost unlimited number of trees. The family of trees produced from one bud-parent is called a 'clone.' There are usually about 100 trees per ac. at the bearing stage. The tree grows to a height of 100 ft and has a diameter when fully grown of about 36 in. An intercrop of some kind is necessary between the trees, especially with young trees and on hilly ground, to prevent soil erosion under the tropical conditions. The trees are not tapped until they are some 6-7 years old. In tapping, the cut is made deep enough to sever the latex tubes but not to damage the cambium, a paper-like skin between the bark and the wood. Many types of cut have been used in tapping. Perhaps the most popular is a slightly sloping cut made half-way round the circumference of the tree. Tapping is done on alternate days and in the early morning, as the flow of latex is then greatest. The yield of latex varies from tree to tree, and according to the age of the tree, the climatic conditions, and other factors. About 4½ oz. of latex per tree per tapping is an average figure; it produces about 600 gallons per ac. per annum. This has been much exceeded with special clones. The bark which is cut away in tapping is gradually renewed, this taking from 6 to 10 years. If left in the natural state for any length of time the latex coagulates naturally and becomes putrid. A little sodium sulphite may be added to the collecting cups to prevent premature coagulation.

The latex is collected and transported to central bulking stations. It varies somewhat in R. content, and as coagulation takes place more uniformly in dilute solutions it is diluted to a standard sp. gr. proportional to R. content. It is then ready to be made into smoked sheet or pale crépe. If smoked sheet is to be made formic acid is added immediately. This causes coagulation, the milky liquid setting to a junket-like mass. The coagulation is usually carried out in partitioned tanks. The partitions do not quite touch the bottoms, and in this way a continuous sheet of coagulum is obtained. The

coagulum is removed and squeezed between a series of rollers to consolidate into sheets and to remove water. The final sheet is about $\frac{1}{2}$ in. thick. It is then allowed to air dry for a few hours and then hung up in special heated sheds, filled with smoke from burning timber. The presence of smoke both aids quick drying and prevents fungus attacking the R. When dry, in about 5 days, the R. is baled and is then ready for shipment.

If pale cr pe is to be made sodium bisulphite is first added to the latex to prevent surface oxidation. When subsequently coagulated the latex thus retains its characteristic white to light yellow colour. Coagulation and squeezing are the same as for smoked sheet, except that stronger machinery is required, as the R. is eventually rolled out to about 0.045 in. thick. The thickness required for sole cr pe is made by pressing thin layers together when warmed. In this way a smooth surface is obtained.

The latex which naturally coagulates on the tree, which spills on the ground, or which is contaminated in any other way is treated in various ways and sold as off-quality R. A large amount of preserved latex is now also exported. In this case gaseous ammonia is added to the bulked latex to prevent putrefaction and coagulation. This latex is then either shipped direct or concentrated to remove part of the water content by centrifuging, creaming, or evaporating before shipment.

CHEMISTRY OF RUBBER. Latex from *H. brasiliensis* consists of about 36 per cent solids in a water dispersion. Approximately 91 per cent of the solids is R. hydrocarbon, the rest being mineral matter, resins, and proteins. Small amounts of many other organic substances have been identified in latex. Coagulated and dried R. (both smoked sheet and cr pe) also contains about 91 per cent R. hydrocarbon. R. hydrocarbon is polymerised isoprene (C_5H_8) with a straight-chain structure.

R. is dissolved by benzene, carbon tetrachloride, and many other solvents. It undergoes all the reactions typical of a highly unsaturated organic chemical, and it combines with hydrochloric acid to give a plastic material (plioflin) which is extensively used for packing foods. R. reacts with sulphuric acid to give balata-like materials which are used for bonding R. to metal.

By far the most important chemical reaction of R. is that of R. with sulphur. This reaction has come to be called vulcanisation. The importance of this reaction lies in the fact that although under certain conditions raw R. is tough and elastic, it becomes very hard in winter and soft and sticky at summer temps. In the early 19th cent. both Europeans and Americans found raw R. suitable for making waterproof overshoes and other articles, and, as a solution in turpentine, suitable for waterproofing cloth. These articles all suffered from the disadvantages above mentioned. Many attempts were made to overcome this thermal instability.

For example, 1 R. layer between two layers of canvas produced the macintosh raincoat. This overcame the difficulty in some measure. Positive success was obtained by Goodyear in America, who found that an intimate mixture of R. and sulphur when heated for some time gave a material which maintained its flexibility at much lower temps. and did not become sticky in summer. Hancock in London also discovered this effect with the help of some samples from America, and gave the reaction the now accepted name of vulcanisation. It was found that the product obtained depended on the amount of sulphur added and the time of heating. Addition of 8-10 per cent sulphur gave a soft, flexible product, while 30-40 per cent gave a hard, brittle material (vulcanite), after suitable heating. This reaction with sulphur is the basis of nearly all R. goods manuf. Exceptions are adhesive tape manuf., where a permanent stickiness is required, and pure cr pe soles. Very thin articles can be vulcanised by sulphur chloride, using either a solution of this in carbon disulphide or some other solvent, or sulphur chloride vapour in a heated chamber. There are the cold-cure and vapour-cure methods of vulcanisation. A relatively few other substances, including selenium, tellurium, and certain organic chemicals, give a product similar to the R.-sulphur reaction product. The vulcanisation with sulphur can be modified by the accelerators, activators, etc. (see below).

Vulcanisation is not reversible, and devulcanised R. has never been made. Vulcanised R. scrap is, however, reclaimed on a very large scale. This is done by heating cut-up vulcanised scrap R. with oils at high temps., and in other ways. Scrap containing fabric (e.g. tyres) is usually digested with caustic soda to remove the fabric. The oils and heat have a softening effect, and a product is obtained which can be used as cheap substitute for new R., and which can be vulcanised in the same way as new R. The physical properties of vulcanised reclaimed R. are much inferior to those of similarly vulcanised new R.

RUBBER GOODS MANUFACTURE. This can be broadly divided into two classes: that based on dry rubber, by far the larger, and that based on preserved latex.

Manufacture of Goods from Dry Rubber. Although goods based on dry R. cover a tremendous range in consistency and uses, there are relatively few different manufacturing processes. The main ones are extrusion, calendaring, and press moulding. Many articles are hard-built from sheets of R., extruded R., and R.-covered fabric. Vulcanisation, with the exceptions given above, is always one of the steps. It is mainly upon the addition of different ingredients and different amounts of the same ingredient that the manufacturer relies for obtaining different end products.

As the R. as received is too hard for mixing with other ingredients, it is first

masticated. This is done either by passing the R. many times through the nip between two revolving steel rollers, or by feeding into very sturdily constructed internal mixers with strong blades. By this mechanical treatment the R. becomes softer and stickier and more like putty, the degree of change depending on the length of time of mastication. This mastication reduces the R. to a state in which it will readily mix with other ingredients, and also decreases the elastic properties of the R., which is necessary to aid extrusion and calendering.

The next operation is mixing, carried out on the same types of machine as is mastication. In the case of open-mill mixing the masticated R. is allowed to form a hand round 1 roller, with excess R. forming a bank in the nip between the rollers. The other ingredients, usually ground extremely fine, are then added to the R. in the nip, whereupon, by passing through the nip with the R., they become intimately mixed into it. In the case of internal mixers the masticated R. is fed into the machine and the other ingredients added. These are then kneaded into the R. by passing with it through the narrow clearances between the blades and the walls of the mixer. In either case the mixing operation is always finished by blending the plastic mass by passing it through the nip of a 2-roll mixer to homogenise it and obtain it in convenient sheet form. Internal mixing is much faster than straight 2-roll mixing.

Since Goodyear's day the art of R. compounding has developed considerably. Modern compounding will be illustrated by giving a mix for a particular job; below is a typical first-quality tyre-tread compound:

		Parts by Weight
Smoked sheet	.	100.0
Gas-black	.	47.5
Pine tar	.	2.0
Antioxidant	.	1.5
Zinc oxide	.	3.0
Stearic acid	.	3.0
Vulcanisation accelerator	.	1.0
Sulphur	.	3.0
		<hr/> 161.0

The last 4 ingredients are grouped together, as these form a modern vulcanising system. The vulcanisation accelerator greatly speeds up the rate at which the R. and sulphur combine. A few inorganic substances, such as zinc oxide and litharge, increase the rate of vulcanisation, but certain complex organic chemicals, such as mercaptobenzothiazole and diphenylguanidine, have a much more powerful effect, and are nowadays used almost exclusively. Certain accelerators are so powerful that they can vulcanise R. in about 24 hrs at room temp. When accelerators are used much less sulphur is required than would otherwise be the case. Most accelerators function best when an activator (such as zinc oxide) and a fatty acid (such as stearic acid) are

present. The stearic acid and pine tar aid the mixing and subsequent extrusion operations. Antioxidants are certain organic chemicals which have been found to prolong the useful life of R. articles and reduce perishing. The gas-black (made in the U.S.A. by the incomplete combustion of natural gases) greatly improves the abrasion resistance of the compound, as is required in a tyre tread. Many materials other than those in the above mixing are added to R. compounds, either to improve the properties of the finished article or to cheapen it. After mixing the compounded R. is ready for either extrusion or calendering.

Extrusion. An extrusion machine is somewhat similar in design to a household mincing-machine, though much more strongly built, and motor-driven. It consists of a barrel containing a rotatable worm. At one end of the worm is a feed opening. The barrel is longer than the worm at the other end, and at the end of the barrel is the die which shapes the plastic mass to the desired form. In operation the compounded R. is wormed up on a 2-roll mill similar to a mixing mill, and then cut into strips and fed into the machine. When enough material has been accumulated to build up a pressure in the space between the end of the worm and the die the R. extrudes through the die in the desired shape. A modification of the extrusion machine is used for covering wire and other materials with R. The extruded material is often placed in trays of talc or on a mandrel to help the plastic material retain its shape. After being placed in trays of talc many types of R. goods, such as gas tubing, all-rubber garden hose, and door-seal sections are vulcanised in autoclaves, using steam at about 40 lb. pressure as the heating medium. Unvulcanised extruded sections are also used as blanks for mouldings and as parts of hand-built articles.

Calendering. A calender is used to obtain a continuous long length of uncured R. stock free from air blisters and of uniform gauge. It consists of 3 or 4 hollow steel rolls similar to those on a mixing machine but placed one above the other. In operation the wormed-up stock is fed into the nip between the top rolls, forming a bank. The material which passes through this nip is then led through the nip between the third and second rolls. The nip openings are arranged so that a much smaller bank is formed here. By this decreasing size of bank air pockets in the stock are eliminated. The sheeted material is finally wound up on a metal drum, some method, such as interleaving with cloth, being used to prevent the sticking together of the separate turns on this roll. Normally very fine sheetings are built up from a number of thin layers, using special fittings on the calender for this. The calender is also used for impregnating fabric with R. and for covering fabric with a layer of R. The calendered material may be used as 'blanks' for moulding, or as part of a hand-built

article, or be vulcanised as sheeting in steam-heated autoclaves. Many types of gaskets, packings, and so on are made by cutting or punching the desired shape from such vulcanised sheeting.

Spreading. Both raw and compounded (but unvulcanised) R. disperses to form a colloidal solution (dissolves) in a number of organic solvents. Thick solutions or doughs can be made by soaking the stock in a solvent and then homogenising the mixture in a mixer which may resemble a baker's dough-kneading machine, though other types are also used. Naphtha, a solvent obtained from coal-tar, is used almost exclusively for making doughs. These doughs are used for rubberising fabric by the use of a spreading machine. This consists of a rotatable roller with a fixed steel blade above, the opening between the roller and the blade being adjustable. The cloth to be spread is drawn through this opening and a sufficiency of dough placed on the cloth in front of the blade, so that by the wiping action of the blade a thin layer of R. passes through the opening on the cloth. Very thin layers may be applied in this way. Usually sev. layers are applied, so as to obtain a finished coating free from pin-holes. For example, a 'hunter's type' raincoat usually consists of 2 layers of cloth, each of which has been 'spread' 4 times. The spread material is used, for example, for raincoats, hospital sheetings, barrage balloons, etc. It may also be used as part of such built-up articles as galoshes. The spread sheeting can be vulcanised directly by placing in steam autoclaves or by festooning in hot-air chambers. Thin spread articles are sometimes cured by the cold-cure method, as this gives a pleasant velvety feel to the R. Vulcanisation, using room-temp. accelerators, is now largely used for raincoat material.

Moulding. R. cannot be cast like metals, because it decomposes on melting. In the R. industry moulding means placing a piece of compounded R. of suitable size and shape in a metal mould. The mould is then closed in a steam-heated hydraulic press. The pressure and heat cause the R. to flow to the shape of the mould. The further action of heat vulcanises the R., so that on opening the mould the article is obtained in the desired shape and also vulcanised. Moulded goods include, for example, hot-water bottles and also such things as tyres, in which case the blank is built up from extruded and calendered R. and fabric.

Manufacture of Goods from Latex. The production of goods straight from latex is a much newer process than production from dry R. It is used to make many types of very thin articles, such as surgeons' gloves and toy balloons. It is also used for adhesives in the footwear and flooring trades. The production of sponge for upholstery is also important.

In compounding the vulcanising and filling ingredients are made into water dispersions and then stirred into the latex. The chemicals used are the same as those

for dry R. Seamless articles are made by dipping a former of the desired shape in compounded latex. On withdrawal a thin film of latex adheres to the former. After redipping, if necessary, to build up a thickness, this film can be dried and cured in hot air. Latex sponge is produced by whipping the compounded latex into a foam. The whipped latex can then be poured into moulds and by the use of special chemicals gelled in the foamed state, when it is further dried and vulcanised.

SYNTHETIC RUBBERS. An enormous number of experimental polymers and co-polymers have been produced in the last 60 years, and of these a few have been found, by a vast process of selection by trial, to be suitable for use as synthetic R.s and plastics. For synthetic R.s, polymers of butadiene (a chemical similar to isoprene), and co-polymers of butadiene and other chemicals have been most widely used. In 1955 the Goodrich, Firestone, and Goodyear Companies claimed that a synthetic R. produced from mass polymerisation of isoprene was equal to natural R. Also important are polymers of chloroprene, and to a lesser extent polymers of the polysulphides of such organic chemicals as ethylene. Some other polymers are also used to a small extent for special purposes.

General-purpose Synthetics. These are synthetic R.s intended to replace natural R. for all purposes, and have been produced by countries for national security reasons. Most important are co-polymers of butadiene and styrene (Bena S in Germany, Glt-S in U.S.A.). Both these countries have successfully produced this synthetic R. on an enormous scale, and it has been a reasonably successful substitute for natural R.; it can be processed, compounded, and vulcanised in the same way as can the latter.

Special-purpose Synthetics. In certain applications natural R. parts fail quickly. A most important case is where they come in contact with motor oils and fuels, which cause them to swell and disintegrate. Sev. materials have been developed to meet the need of an oil-resistant elastic material for use in car and aeroplane parts. Butadiene-acrylonitrile co-polymers (Hycar Olt, Perbunan in U.S.A.; Bena N in Germany), and chloroprene polymers (Neoprene GN in U.S.A.) are the most widely used and most nearly resemble natural R. in vulcanised properties, including elasticity. They can be processed and compounded in the same way as natural R., and the butadiene-acrylonitrile co-polymers can be vulcanised in the same way as natural R. The chloroprene polymers are, however, vulcanised by zinc oxide and magnesium oxide. Two new oil-resisting synthetics, poly F.B.A. (a polymer of dihydro-per-fluorobutyl acetate) and Kel F (a halogen-substituted hydrocarbon polymer) have recently shown great promise. The polysulphide polymers (Thekol in the U.S.A., Novoplas in Great Britain) have excellent resistance to fuels, but their general physical

properties are poor compared with natural R., and their use is restricted to applications where their inability to recover from deformation quickly is not important.

RUBBER AND PLASTICS. There has been a great increase in the production of plastics (q.v.) of various kinds in recent years, and they have been in competition with natural R. in many fields. In the raincoat and vulcanite trades they have taken over a considerable amount of the demand formerly supplied by natural R. Their bright glossy finish is one great advantage, but the generally higher cost per pound of plastics and their non-elasticity has so far limited their use.

See C. Goodyear, *Gum Elastic*, 1855; A. T. Edgar, *Manual of Rubber Planting*, 1937; A. McFadyen, *History of Rubber Regulation*, 1944; H. Barron, *Modern Rubber Chemistry* (2nd ed.), 1947; R. J. Noble, *Latex in Industry* (2nd ed.), 1953; G. S. Whitby (editor), *Synthetic Rubber*, 1954; H. J. Stern, *Rubber: Natural and Synthetic*, 1954.

Rubble, form of stone used in masonry. In rubble-work the stones are of different sizes and are laid unevenly, whereas in the other kinds of masonry, such as coursed work and ashlar, the stones are squared and dressed. See **MASONRY**.

Rubbra, Edmund (1901-), composer, b. Northampton and educ. at Northampton, Reading Univ., and the Royal College of Music, where he was a pupil of Holst and of Vaughan Williams. His work is strongly individual, and he makes skilful use of melodic invention and elaborate counterpoint. Most important among his works are his 8 symphonies and his 2 Masses, and he has written very characteristic music for unaccompanied chorus. Works for solo instruments and orchestra (incl. a viola Concerto), instrumental and vocal chamber music, and songs are also outstanding.

Rubefacient, medicinal agent applied to the skin with the effect of reddening it by dilation of the superficial capillaries. The object of such a remedy is to allay inflammation by counter-irritation. The most commonly used are hot water, mustard, pepper, turpentine, and chloroform.

Rubella, see **MEASLES**.

Rubens, Sir Peter Paul (1577-1640), Flem. painter, b. Siegen, Westphalia, where his father, Jan R., was in exile. At the age of 16 he entered the household of the countess of Lalaing as page, and later studied under Van Noort, Verhaeght, and Otho Venius. In 1600 he visited Italy, where he finally took up his residence at the court of Mantua. His stay at Venice brought him under the influence of Titian and Paolo Veronese, and affected his later development, probably teaching him much of the art of colour in which he excelled. In 1605 he visited the Sp. court, where he executed many portraits. Three years later he returned to Antwerp, where he married Isabella Brant (1609). Here numbers of eager students flocked to his studio, and of these he made use in the execution of the orders which flowed in without ceasing. Hence it is

often impossible to say how much of one of the larger works is his own. This may also account for the mediocrity of many of the paintings of his 'middle period.' In 1620 he received the commission for the series of paintings of the life of Marie de' Medici, now in the Louvre, and these were completed in 5 years. In 1629 he visited England, where he was warmly received by Charles I, for whom he decorated the ceiling of the Banqueting Hall, Whitehall, being knighted in 1630. Having become a widower in 1626, he married Helena Fourment in 1630. She appears in many of his paintings. R. is a master of those parts of his art which act immediately on the senses, especially in the portrayal of the tumult and energy of human action in



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SELF-PORTRAIT BY RUBENS

full power and emotion. He shows the early baroque period at its most human and at its richest. His influence on painters—Watteau, Delacroix, Manet, and others—has been enormous. Some critics have deplored his lack of spirituality, yet his range and power defy criticism. Not only in religious pictures (e.g. the 'Descent from the Cross,' Antwerp, c. 1611-14), but in portraiture (e.g. the 'Chapeau de Paille,' National Gallery, c. 1620), peasant scenes (the 'Kermesse,' Louvre, c. 1622), landscape ('Castle Steen,' National Gallery, c. 1635-7), and allegory ('War and Peace,' National Gallery, c. 1629-30), he is the genius of abundance. See lives by M. Rooses, 1886-91; J. Burckhardt, 1928 (new Eng. ed., 1950); and J. Muls,

1946; also E. Cammaerts, *Rubens, Painter and Diplomat*, 1932; F. R. Lehmann, *Peter Paul Rubens, Menschen und Mächtige des Barock*, 1936; C. Verschaeye, *Rubens, das Spektrum Flanderns*, 1938; L. van Puyvelde, *The Sketches of Rubens*, 1948.

Rubiaceae, family of about 4500 species of herbs, shrubs, and trees, chiefly tropical, but some of temperate and arctic regions. Leaves are usually stipular, opposite, and entire; flowers in cymes or panicles, regular, 4 or 5-parts, with inferior ovary, fruit a berry, capsule, or schizocarp. Genera include *Anthospermum*, *Asperula*, *Bouvardia*, *Burchella*, *Calyophyllum*, *Cephalanthus*, *Cinchona*, *Coffea*, *Coprosma*, *Galium*, *Gardenia*, *Glycosmis*, *Ixora*, *Lindera*, *Mitchella*, *Ozyanthus*, *Randia*, *Timonia*, *Uncaria*, etc.

Rubicon, small stream of anc. Italy, flowing into the Adriatic N. of Ariminum, and forming the boundary of Gallia Cisalpina. It is noted for Caesar's passage in 49 BC, which began the civil war. The R. is commonly identified with the modern Fiumicino, which was crossed by the Brit. Eighth Army near San Arcangelo and Poggiberni in Sept. 1943. This identification, however, is much disputed.

Rubidium, symbol Rb, atomic number 37, atomic weight 85.4, one of the alkali metals. It was discovered by Bunsen in 1860 by spectroscopic examination of the residue obtained by evaporating the mineral water of Dürkheim. It also occurs in rare minerals, as pollux and lepidolite, and in tea, coffee, cocoa, and tobacco. The metal is obtained by heating a mixture of the carbonate with carbon and calcium carbonate, or alternatively, by the electrolysis of fused R. hydroxide in a nickel crucible. It is a white, chemically active metal, melting at 39°, and its properties are very similar to those of potassium.

Rubinstein, Anton Gregorovich (1829-94), Russian pianist and composer, b. Vykhvotnets, Volhynia, of Jewish descent. He studied in Moscow and Berlin. At the age of 12 he had already appeared as a pianist in various European cities. In 1858 he became court musician at St Petersburg. In 1859 he became leader of the Musical Society in St Petersburg, and in 1867, with his brother Nicolai (1835-81), a pianist of great ability, founded the Conservatory there. His chief tours took place between 1867 and 1873, in which period he earned a great reputation in Europe and America. As a composer R. was antagonistic to the neo-Russians and to the Wagner-Liszt school. He was a prolific writer of piano and vocal music, and composed 4 piano concertos and the *Ocean* symphony; he wrote also some operas and oratorios. He was a pianist of transcendent ability, and the only serious rival to Liszt. See lives by J. Rodenberg, 1895, and N. D. Bernstein, 1911.

Rubinstein, Artur (1886-), Polish born Amer. pianist, b. Lodz. He gave his first recital at the age of 11, and studied music in Berlin. He toured N.

America in 1906 and S. America in 1918. He settled in Los Angeles in 1927. R. has written some original compositions, but is known primarily as a brilliant pianist.

Rublev, Andrea, see RUBLEV.

Rublyov (or Rublev) Andrea (c. 1370-c. 1430), Russian artist who worked in Moscow, accounted the most famous of the Russian icon painters. His work is distinguished from that of the Cretan Byzantine School by its delicate colouring, rhythmic composition, and more emotional feeling. What little of his work survives is to be seen in the Troitsa-Sergios-Lavra monastery, now a museum, near Moscow, which contains his masterpiece, the 'Holy Trinity.'

Rubrics (Lat. *ruber*, red), rules and directions for the conduct of divine service given in the service books of the Church. They are so called because they are written or printed in red.

Rubruquis, Guillaume, see RUSSEBROECK. **Rubtsovsk**, tn in the Altay Kray of S. Siberia, 165 m. SW. of Barnaul. It is a major centre of agric. engineering (since Second World War). Pop. (1956) 95,000 (1939, 23,500).

Rubus, family Rosaceae; genus of shrubs, and herbs, with 5-parted white or pink flowers in axillary and terminal clusters, followed by edible fruits or drupes. *R. chamaemorus* is the Cloud-berry of peat bogs in Britain; *R. fruticosus* Blackberry, is now divided as a sub-genus; *R. idaeus*, the Raspberry; *R. deliciosus*, *R. odoratus*, and *R. spectabilis* have floral qualities for the garden.

Ruby, precious stone of corundum (q.v.), and thus of the same composition as sapphire (q.v.), except for the substance, probably chromium, causing the red coloration. It crystallises in the hexagonal system, has a range of colour from pink to deep red or violet, has a sp. gr. of 4, and a hardness of 9. The R. is dichroic, that is, it exhibits 2 different shades when examined with a dichroscope, and this property serves to distinguish it from garnet and spinel, which are not doubly refracting. True or oriental R.s are found in greatest quantity in Burma and Siam, the prin. dist. being Mogok, N. of Mandalay; they are found, in smaller quantity and of poorer quality, in Ceylon and Afghanistan. Many stones known as R.s are garnets or spinels. Small R.s used to be fused together to form a large 'reconstructed' R. Verneuil has produced artificial R.s from ammonia alum, and chromic oxide closely resembles the natural stone, but its glass-like perfection lacks the colour nuances of real gems.

Ruby-Flies, or **Ruby-Tails**, parasitic family of hymenopterous insects, named from the brilliancy of their colouring, which shines with a metallic glow.

Ruby Spinel, see SPINEL.

Ruby Sulphur, see REALGAR.

Ruccellai, Giovanni (1475-1525), It. poet, b. Florence, and sent as ambas. to Venice in 1505, later taking an active part in the measures which led to the restoration of the Medici family. In 1522 he was

sent as ambas. to France, and subsequently Pope Clement VII appointed him governor of the castle of St Angelo. He endeavoured to make It. poetry classical in form, and was the author of 2 tragedies, in the style of Euripides, *Rosamunda* and *Oreste*, but, as in the plays of Trissino, Speroni, and other lesser It. tragic poets of the Renaissance, the finer humanistic elements, considered as a revelation of the world and mankind, had no free scope. He also wrote a didactic poem on bees, entitled *Le Api*, pub. 1539, based on Virgil's *Georgics*, book iv.

Ruck, Berta (1878-), novelist, b. Wales. She studied art at the Slade School and in Paris, but turned to novel-writing, at which she was a popular success. *His Official Fiancée*, 1914, her first book, was followed by over 50 others, a few of the titles being *The Girls at his Elbow*, 1916, *The Girl Who Proposed*, 1918, *Sweethearts Unmet*, 1919, *The Wrong Mr Right*, 1922, *Kneel to the Prettiest*, 1925, *To-day's Daughter*, 1930, *Mock-Honey-moon*, 1937, *Love and Apron Strings*, 1949, and *Fantastic Holiday*, 1953. *A Story-teller Tells the Truth*, 1935, is an autobiography. She married Oliver Onions (q.v.), the novelist.

Rückert, Friedrich (1788-1866), Ger. poet and orientalist, b. Schweinfurt. He was prof. of Arabic, Persian, and Sanskrit at Erlangen, and then at Berlin. R., who was a master of over 20 languages, was chiefly known as a translator of oriental poetry, and as a writer of poems inspired by the spirit of oriental masters. His best-known works are his lyrical poems, *Liebesfrühling*, and his patriotic songs, *Geharnischte Sonette* and *Spott-und Ehrenlieder*. In 1834 appeared his beautiful *Kindertotlieder*, inspired by the loss of his young son and daughter. Among his original poems on oriental themes are *Morgenländische Sagen und Geschichten*, 1837, and *Rostem und Suhrub, eine Heldengeschichte*, 1838. His most elaborate work is *Die Weisheit des Brahmanen*, pub. in 6 vols. in 1836-9. See lives by C. Beyer, 1863, and F. Gölting, 1935.

Rudbeckia, genus of composite plants. It received its name from Linnaeus in honour of the Rudbecks, who preceded him in the botanical chair at Upsala. The 30 species grow in N. America. *R. hirta*, Black-eyed Susan, and *R. lucinata*, Cone Flower, are popular garden species.

Rudbeckius, Olaus (1630-1702), Swedish author and scientist, son of the bishop Johannes R. He studied medicine at Upsala, where he later became prof. In his weighty work *Atlantica* he tried to prove that Sweden was the home of ant. civilisation. It was trans. into Latin, and exerted a deep influence at the time.

Rudd, or Red Eye, fresh-water fish, *Scardinius erythrophthalmus*, allied to the roach. It is tinged with bronze, and has reddish fins, the dorsal being farther back than that of the roach. It is found in Brit. and European lakes and sluggish streams. The largest are 3½ lb. and may be as much as 18 in. long.

Rudder Fish, see **PILOT FISH**.

Ruddiman, Thomas (1674-1757), scholar, b. Boyndie, Banffshire. Educ. at King's College, Aberdeen, he was a schoolmaster at Laurencekirk. In 1709 he joined the staff of the Advocate's Library in Edinburgh, and rose to be chief librarian from 1730 to 1752. One of the foremost Scottish Latinists, he pub. in 1714 *Rudiments of the Latin Tongue*, long the standard elementary grammar in Scottish schools, and in the following year an edition of the works of George Buchanan.

Rüdesheim, Ger. tn in the *Land* of Hesse (q.v.), 17 m. WSW. of Wiesbaden. It stands on the r. b. of the Rhine, opposite Bingen, and is in the Rheingau (q.v.). There are notable fortifications. The wine of R. is famous. Pop. 6500.

Rudini, Antonio Starrabba, Marquis of (1839-1908), It. statesman, b. Palermo. In 1859 he joined the revolutionary committee, and in 1866 became mayor of Palermo. Three years later he was appointed minister of the interior, and in 1891 formed a gov., being overthrown within 15 months, but returning to power in 1896. He retired from office in 1898. During his administration he renewed the Triple Alliance, and placed It. finance on a sound basis, but his gov. lacked leadership generally.

Rudock, tn of Tibet, on the Kashmir frontier. It is situated 15,000 ft above sea-level.

Rudolf I (1218-91), Ger. king and Holy Rom. emperor, son of Albert IV, count of Hapsburg and landgrave of Alsace. He succeeded his father as head of the family in 1239, and having become the most powerful prince in the country, was elected king of the Germans in 1273. In 1278, he fought a successful war with Ottakar II of Bohemia, who was killed in the battle of Marchfeld. In 1282 he invested his sons, Albert and R., with the duchies of Austria and Styria respectively. He had won these from Ottakar. He is chiefly memorable as the founder of the greatness of the house of Hapsburg. See life by O. Redlich, 1903.

Rudolf, or Rudolph, II (1552-1612), Holy Rom. emperor, King of Bohemia and of Hungary, b. Vienna and educ. at the Sp. court. Son of the Emperor Maximilian II and Mary of Austria, R. became emperor in 1576. Throughout his life he showed a lack of concentration and a morbid timidity. R., however, was a man of culture, devoted to the arts and sciences. He much improved the cap. of Prague during his residence there, and patronised Brahe (q.v.) and Kepler (q.v.). He was much influenced by his favourites and appears to have been, in his latter years, mentally unbalanced. R. was in part responsible for the violent persecutions in Bohemia and Moravia which characterised the Catholic reaction of the first years of the 17th cent. There was a Turkish invasion in 1593, and a Hungarian rebellion in 1604. In 1606 the archdukes pronounced R. unfit to rule, and in 1608 R. ceded to his brother

Matthias all his ters. except Bohemia, Lusatia, and Silesia. He did eventually give concessions to the Bohemian Protestants. He was compelled to abdicate the throne of Bohemia in favour of Matthias in 1611. See life by A. Gindely, 1863-5.

Rudolf, Franz Karl Joseph (1858-89), archduke and crown prince of Austria-Hungary, only son of the Emperor Francis Joseph. He was a good linguist, and besides assisting in the pub. of *Die Österreichische-Ungarische Monarchie in Wort und Bild*, 1886, he wrote *A Journey in the East*, 1884, and *Fifteen Days on the Danube*, 1885. He married Stephanie, the daughter of the King of the Belgians, in 1881; he committed suicide with the Baroness Vetsera, in circumstances which have never been fully clarified, at Mayerling, near Vienna.

Rudolf of Ems (fl. 1220-54), Austrian minnesinger. He wrote *Barlaam und Josaphat*, *Alexander*, and other epic poems, and a *Welchronik*, dedicated to Conrad IV.

Rudolf (Rudolph) Lake, African lake partly in Ethiopia, but for most of its length in NW. Kenya. It is 185 m. long, and 37 m. wide at its widest point. Altitude 1250 ft.; maximum depth 240 ft. R. L. is rapidly diminishing in area. It was discovered in 1881 by Teleki and von Höhnel, who named it after Crown Prince Rudolf of Austria-Hungary.

Rudolstadt, Ger. tn in the dist. of Gera, in the Saale valley, at the NE. foot of the Thuringian Forest, 35 m. WSW. of Gera (q.v.). It dates from the 7th cent., and was the seat of the counts of Schwarzburg-Rudolstadt, 1573-1918. There is a fine 18th-cent. palace (now a museum), a castle, and a medieval church. Porcelain and electrical equipment are manufactured. Pop. 20,000.

Rudra, Hindu god in the Rigveda or Vedic mythology; he is the storm-god or lord of the Maruts, later identified with Siva. R. is sometimes a collective name of the Maruts (gods of the tempests).

Rue, Warren de la, see *DE LA RUE*.

Rue or **Herb of Grace**, the hardy evergreen shrub, *Ruta graveolens*, of S. Europe, containing a volatile, acrid oil, used medicinally, as a narcotic and stimulant. Goat's R. is *Galega officinalis*; Meadow R., *Thalictrum flavum*.

Rueda, Lope de (c. 1510-65), Sp. dramatist, b. Seville. He was originally a gold-beater, but later organised a strolling company of players, thus laying the foundations of the popular theatre in Madrid and Seville. R.'s regular comedies are modelled largely on those of It. authors of the early 16th cent. His short sketches or *pasos*, which have the character of the coming comedy of intrigue, include such witty interludes as *El Convidado*, *El Ruflán Cobarde*, and *Las Acetunas*. See study by G. Salazar, 1911.

Ruelli-Malmaison, Fr. tn in the dept of Seine-et-Oise, a W. suburb of Paris. In the church are the tombs of the Empress Joséphine (q.v.) and Queen Hortense (q.v.). Buzenval, near by, was the scene

of a battle (1871) during the Franco-German war (q.v.). There are chemical and metal industries. Pop. 27,000. See also MALMAISON.

Ruff, frill made from linen or lawn and worn on top of the neckband. It was popular with both sexes in the 16th and 17th cent., and with the introduction of starch it greatly increased in width. It varied in length from 1½ to 6 yds, and was drawn up by a string. The earlier form relied more on elaborate folds for its effect; but lace, gold and silver, and jewellery decorated the later type, or *whisk*. A 'suit of R.'s' consisted of a R. with a pair of matching cuffs.



MEADOW RUE

Ruff and **Reeve** (*Philomachus pugnax*), summer migrant to low-lying, marshy dists. of Britain. The males (R.s) vary considerably in plumage, but during the breeding season the neck is surrounded by a ruff or frill of purple-black feathers barred with chestnut, which fall at the end of June. The females (reeves) have no R.; they lay 4 spotted green eggs in a nest of coarse grass made amongst reeds or rushes.

Ruffe, or **Pope**, perch-like fish known as *Acerina cernua*. It is a species of Percidae, is edible, and inhabits the fresh water of Europe. The dorsal fin is continuous in the R., whereas in the perch there are 2 separate fins.

Ruffside, Douglas Clifton Brown, first Viscount, (1879-), politician, educ. at Eton and Trinity College, Cambridge. He first entered Parliament as Unionist member for Hexham in 1918. From 1943 to 1951 he was Speaker of the House of Commons, being created a viscount in 1951.

Rufiji, or **Lufiji**, riv. of Tanganyika, rising in the Livingstone Mts, flows E. to the Indian Ocean, discharging by a delta opposite Mafia Is. In the delta grow mangrove trees of considerable commercial value.

Rufinus (Rufinus) Tyrannus (Toranus) (c. 345-410), It. monk and theologian, b. at or near Aquileia. Fellow student and close friend of St Jerome, but later quarrelled bitterly with him over the question of Origen's orthodoxy and worth as a commentator. Under the patronage of Melania, a wealthy and devout Rom. matron who lived in a convent in Jerusalem, It., gathered together in a monastery on the Mount of Olives a number of monks who had suffered persecution under Valens. Here he devoted himself to the study of Greek theology. He is chiefly known for his free trans. of the *Peri Archōn (De Principiis)* of Origen; but the work is not trustworthy, since R., assuming that Origen's writings had been tampered with by heretics, declared that he had suppressed portions containing sentiments from which he dissented or which were contrary to others advanced by Origen elsewhere, on the plea that they were interpolations (*Origen, De Principiis, lib. iii: Prefatio Iuffini, vol. 1, Benedict. Edit.*). He also trans. Eusebius, adding an indifferent continuation of his own to the end of the 4th cent. In 408 he was driven by Alaric to Sicily, where he d.

Rufisque, see DAKAR.

Rufus, Ger. emperor. see OTTO II.

Rufus, William, see WILLIAM II.

Rug, see CARPET.

Rugby, tn of Warwickshire, England, situated on the Avon 12 m. S.E. of Coventry and 82 m. NNW. of London. In the early 19th cent. R. was little more than a vil. The tn expanded with the advent of the London and Birmingham Railway in 1838. It returns 1 member to Parliament, and is an important railway centre and mkt tn, whose electrical and engineering industries are well known, though it is probably most famous for its public school (q.v.). Pop. 46,400.

Rugby League, see FOOTBALL.

Rugby School, public school for boys, founded by Lawrence Sheriff of Rugby in 1567. The school removed to the present site about 1750, and the existing buildings were begun in 1809. There have been many modern additions. Thomas Arnold (q.v.) was headmaster from 1828 to 1842; under his guidance the school became a pattern, educationally and spiritually, for many Eng. public-school foundations of the 19th cent. Tait, Frederick Temple, and Percival were later headmasters. R. S. is the scene of *Tom Brown's School-days*. Rugby football was originated here in 1823.

Rugby Union Football, see FOOTBALL. New laws designed to help attacking Rugby were passed in 1958, see R. F. U. handbook, Twickenham, Middx.

Ruge, Arnold (1802-80), Ger. political reformer. b. Rügen Is. He studied philosophy at Halle, Jena, and Heidelberg. For his part in the Burschenschaft agitations (1821-4) he was imprisoned for 5 years at Kolberg. With Eichtermeyer, he founded the *Halleische (later Deutsche) Jahrbücher*, 1837, the organ of the young Hegelian school. This periodical was

suppressed in 1843. R. shared in the revolutionary movement of 1848, but in 1849 with Mazzini and Ledru-Rollin, had to seek refuge in London, forming a 'European Democratic Committee.' From this R. soon withdrew and went to Brighton in 1850. See his memoirs, *Aus früherer Zeit*, 1868-7.

Rugeley, urb. dist. and mkt tn in Staffordshire, England, 9 m. S.E. of Stafford, on the R. Trent. It is engaged in coal mining and has iron foundries, tanneries, and mills. The grammar school was founded in the 17th cent. Pop. 11,000.

Rügen, Ger. is. in the Baltic Sea, separated from the Mecklenburg coast by the Strela Sound (1½ m. wide). Since 1936 it has been connected with Stralsund (q.v.) on the mainland by a causeway. It was inhabited originally by the Rugieri, then by Wends (q.v.). In 1168 it was taken by the Danes. It went to Pomerania in 1325, to Sweden in 1648 by the treaty of Westphalia (q.v.), and to Prussia in 1815. During the Second World War it was captured by Russian troops in May 1945. On the N. promontory, Arkona, there long stood a famous fortress, and here also was the temple of the Wend god, Swantewit, which was destroyed by the Danes. The soil is fertile, cattle are reared, and there are fisheries. Cap. Bergen. Area 373 sq. m.; pop. 90,000.

Rugendas, Georg Philipp (1666-1742), the chief of a family of Ger. painters, painted battles and landscapes; a pupil of Fischer. His work was influenced by that of Borgognone, Lambke, and Tempesta. R. travelled in Italy (1692-5) and studied under Molinari at Venice. During the siege of Augsburg (1703) he risked death by drawing the scenes around him in the very midst of the engagements; afterwards pub. etchings of them. Brunswick Gallery and Hampton Court contain examples of his works. See Count Stillfried, *Leben*, 1879.

Rugosa, a large group of Palaeozoic fossil corals characterised by the arrangement of the septa in 4 quadrants. They include solitary and colonial forms, and occasionally occur in reefs (or bioherms). They are useful as index fossils in correlating strata.

Ruhmkorff, Heinrich Daniel (1803-77), Ger. physicist, b. Hanover. He went to Paris in 1819, and there set up a business for the manufacturing of electrical apparatus. He was the inventor of the R. induction coil (1851).

Ruhmkorff Induction Coil, see INDUCTION, ELECTROMAGNETIC.

Ruhnken, David (1729-98), Ger. scholar and critic, b. Steip, Pomerania, a pupil of Ritter and Berger at Wittenberg. He left to study Greek at Leyden under Hemsterhuis (1743). By 1757 R. was assistant-lecturer in Greek at Leyden, professor (chiefly of Latin, 1761), and university librarian (1774). Among his works are editions of Homer, Plato's *Theaetetus* and *Timaeus*, Xenophon, and Velleius Paterculus.

Ruhr, Ger. riv., which rises near Winterberg at the E. boundary of N. Rhine-Westphalia (q.v.), and flows N. and then generally W. to enter the Rhine at Duisburg (q.v.). Length 147 m. The R. basin (Ger. *Ruhrgebiet*) is one of the most important areas of heavy industry in Europe, due mainly to its extremely rich coalfield. The chief towns in the basin are Essen, Bochum, Dortmund, Duisburg-Hamborn, Oberhausen, and Gelsenkirchen (q.v.). Düsseldorf and Wuppertal (q.v.) lie on the S. border of the dist. The R. basin is served by sev.

1922 Germany gave notice that she could no longer make the payments agreed upon. Under the Versailles treaty such a situation was provided for, and the govs. concerned had the power to take any action deemed necessary against Germany without Germany being entitled to regard such actions as acts of war. In Jan. 1923 Belgian and Fr. troops accordingly marched into the R. basin and occupied certain areas. The troops were preceded by engineers, custom-house officials, and foresters necessary to work the area. The Germans adopted passive-resistance



Embassy of the Federal Republic of Germany

THE ASSEMBLING WORKSHOP OF A MACHINE FACTORY, DUISBURG

canals, including the Mittelland, the Rhine-Herne, and the Dortmund-Ems, and has a railway network centring at Hamm (q.v.). The greater part of the Ger. production of coal, iron, and steel is in the area.

Position of the Ruhr Basin in Modern Europe. By 1914 Bochum, Dortmund, and Essen had become the prin. industrial centres of the R. basin. Essen was the home of Ger. armaments, owing its growth largely to Alfred Krupp (q.v.) and his son. After the First World War France, in particular, feared the possibility of the R. basin becoming an armaments centre once again. By the treaty of Versailles (q.v.) Germany undertook to disarm, which meant the conversion of the R. factories to non-military production, and agreed to make reparations in money and kind to the Allies. In July

methods and obstructed the work as much as possible; in Nov. 1923, however, the Germans began to co-operate with the Allies in working the area. The R. basin was evacuated in 1925, and after 1933 the war industries of the R. were re-estab., at first secretly, by Ger. industrialists co-operating with the National Socialist regime (see NATIONAL SOCIALISM). During the Second World War the dist. was, therefore, an important target for allied bombers. The first large R.A.F. attack on Essen was made in 1940. From 1941 until the end of the war there were constant attacks throughout the R., the offensive reaching its height in 1944-5. On 24 Mar. 1945 the Allies crossed the Rhine, and the R. basin was encircled by the Americans, and had been taken by mid-April. (See AERIAL WARFARE; EUROPE, History; GERMANY, History; MOHNE.)

After the end of the War the R. basin lay within the Brit. zone of occupation. More drastic dismantling of its industries was decided upon than had been the case in 1919, but the unstable state of the Ger. economy and allied differences made an already complex situation even more difficult. Fr. opinion favoured a separation of the area from the rest of Germany, under international control, but Britain and America wished it to remain a part of Germany under allied supervision. In May 1950 the Fr. foreign minister, Robert Schuman, suggested that France and Germany should have a common coal and steel pool; this statement was welcomed by the Ger. chancellor, since it implied Fr. acceptance that the R. was Ger. and a realisation that both countries were economically interdependent. Plans for the control of the R. industries became obsolete with the coming into force on 25 July 1952 of the treaty setting-up the European coal and steel community.

Ruhrort, formerly a separate tn in the Rhineland, at the junction of the Ruhr and the Rhine (q.v.). Since 1905 it has been a N. suburb of Duisburg (q.v.). There are riv. docks, and there are iron and steel industries.

Ruin, The, an O.E. poem of unknown authorship, describing a ruined city and contrasting its present state with its former splendour; it has been conjectured that it may refer to Bath. It is preserved in the Exeter Book (q.v.). See J. Earle, *An Ancient Saxon Poem of a City in Ruins*, with trans., 1872.

Ruisch (correctly, **Ruilsch**), Rachel (1664-1750), Dutch painter of flowers and fruit. She studied under Van Aelst, and became painter to the Elector Palatine (1708), ranking second only to Van Huysum as a flower painter. Her exotic flowers and insects are especially fine. She married the portrait painter, J. Pool.

Ruislip-Northwood, urb. dist. of Middlesex, England, comprising the old pars of N. and R. and the settlement of Eastcote. It stretches from the N. of the bor. of Ealing to the Hertfordshire border. Mainly a residential area, it has extensive open spaces and woodlands, with 3 golf courses. R. par. church has a 13th-cent. nave and a 15th-cent. tower. The urb., dist. constitutes a parl. bor. returning 1 member to Parliament. Pop. 72,000.

Ruiz, José Martínez, see MARTINEZ.

Ruiz, Juan (c. 1283-1350). Sp. poet and archpriest of Hita. Little is known of his life, except that he was imprisoned between 1333 and 1347 by order of the Archbishop of Toledo for a breach of eccles. regulations. The *Libro de buen amor*, by which R. is remembered, consists of narrative poems of varying length, interspersed with lyrical songs. The poems are written in an autobiographical vein, and describe his own successful and unsuccessful love affairs. Juan Ruiz is one of the greatest of medieval poets, and his book is one of the most interesting and influential of that time. See F. Lecoy, *Recherches sur le Libro de buen amor*, 1938.

Ruiz Aguilera, Ventura (1820-81), Sp. poet, b. Salamanca; he went to Madrid in 1843, and there occupied many official and journalistic positions under the liberal Gov. Among his works are: *Sátiras*, *Ecos nacionales*, 1849, *Elegías*, 1862; *Armonías y Cantares*, 1865, *La Arcadia moderna*, 1867, and *Leyenda de Noche-Buena*, 1872. Selections from his poems, entitled *Inspiraciones* and *Poesías*, were pub. in 1865 and 1880 respectively, and his complete works at Madrid in 1873.

Rukwa, Lake, in Tanganyika, situated between Lakes Tanganyika and Nyasa. It is increasing annually in size. The area around the lake is suspected to be the breeding-place of Red Locusts.

Rule, or **Regulus**, St, legendary Gk monk of the 4th cent., said to have brought the bones of St Andrew to Muckross (now St Andrews) from Patras. Perhaps confused with St Iteul, traditionally the Gk first Bishop of Scyllis.

Rule of Faith (*Regula Fidei*), short statements of belief which the early Church put into the mouth of those about to be baptised, and which formed the safeguard and expression of the orthodox faith. A rudimentary specimen may be seen in 1 Cor. xv. 3, 4, and there is a reference to such a formula in 2 Tim. i. 13. They are the basis of the Catholic creeds. See A. Hahn, *Bibliothek der Symbole*, 1842, 3rd ed. 1897.

Rule of Law. In 1955 jurists from 48 countries met at a congress in Athens and adopted the Act of Athens, which solemnly urged the maintenance of the fundamental principles of the R. of L. This event reflected the growing movement in many parts of the world, particularly in countries which had suffered from or had been threatened by totalitarianism, to strengthen the supremacy of law over arbitrary powers.

The R. of L. is a peculiarly Brit. tradition. It did not mean merely *legality*: a Parl. majority or a dictator may act 'legally' in the sense of enforcing laws made by the sovereign power. It meant something that was the *opposite of arbitrary government*, namely, the principle emerging from the constitutional struggles of the 17th cent.—the *limitation of government and legislation*. The rule of law limited the coercive powers of gov. by tying them to previously announced general rules which applied to everyone in given circumstances so that each person knew his rights and obligations and could order his life accordingly.

In modern times every enactment of the legislature is misnamed a law. But this conception of a 'law' is compatible with tyranny. A law in its proper 'rule of law' sense is, as defined by Blackstone, 'a rule, not a transient sudden order from a superior or concerning a particular person; but something permanent, uniform and universal.' Many modern so-called laws are merely orders to state officials concerning their administration of the machinery of gov. This administrative law is not law in the 'rule of law' sense, because it is not general but par-

ticular, not equal but discriminatory, not certain but unpredictable. In a free society the citizen is subject to the coercion only of previously accepted, general, abstract, impersonal, equal rules.

In establishing such rules the legislature must be guided by principles outside the law itself, that is, by a generally recognised political tradition that it shall not pass laws that infringe the principle of the R. of L. The aim must be to prevent arbitrary coercion. The laws that satisfy this condition are akin to the laws of nature, and are similarly certain, known, general, and universal. (For example, a man who lights a bonfire in his garden knows: (a) that he risks setting alight to the hedge, and (b) that if the hedge is his neighbour's he may have to indemnify his neighbour for the damage.)

In this sense, law can generally be avoided, i.e. the penalties for breaking a contract can be avoided by not making the contract or not breaking it when it is made. In some laws the citizen has no choice, e.g. in paying taxes; but since they are known, they can be taken into account. Some legal duties also are unforeseeable, e.g. service as a juror, or military service in war-time; but these risks apply to everyone, and there can be compensation for damage suffered in the communal cause.

As the great liberal thinkers from Cicero to John Locke saw, there is no conflict between the R. of L. and personal freedom. On the contrary, the R. of L. is an essential condition of human liberty. The R. of L. rests on man-made institutions. In Britain these were not created deliberately but have evolved spontaneously and slowly. As Winston Churchill put it: 'the liberties of Englishmen rested not on any enactment of the state, but on the immemorial slow-growing custom declared by juries and free men who gave their verdict case by case in open court.' That is why the R. of L. has rested on half-realised traditions and has not been systematised. But its meaning has been made explicit by Frenchmen, Americans, Germans, and others in their efforts to explain it to their countrymen or to create by deliberate efforts institutions that would achieve what tradition had achieved in Britain. Thus Montesquieu explained to Frenchmen that the R. of L. in Britain had involved a separation of powers between those who made it, the legislature, and those who applied it, the judiciary. This doctrine was only partly understood in the Brit. constitution, although it had affected its evolution since the 17th cent. Even more fundamental to the R. of L. is the maxim *nulla poena sine lege* (no punishment may be inflicted unless the law already authorises it); this was not explicitly recognised as the law of the land, although it was formulated by Samuel Johnson as early as 1740.

The major principles underlying the R. of L. have generally been firmly estab. in Britain for over 200 years: that the law shall be general, equal, and certain; that

it shall be administered by judges; that the R. separated from the judges; that no punishment may be inflicted unless previously provided for by the law; that govs. may not coerce the citizen in order to serve their own momentary policy; and so on. But there are also others: first, the rights of the citizen need to be made clear; secondly, the R. of L. must not be infringed by routine legislation. Both these are Amer. contributions: the Bill of Rights defined the protected sphere of the individual; and the Supreme Court enforces the written constitution by its power to declare unconstitutional laws made by Congress. Thirdly, the individual must be able to sue the Crown for damage done to him by illegal acts; this right has been estab. in Britain only in recent times.

The purpose of all these safeguards is to restrict the discretion and the arbitrariness of authority in wielding its coercive powers. In the process of gov. discretion is unavoidable. Discretion does not refer to the power of the judges to interpret the law in order to apply its spirit rather than its letter (if it did, this power of the judges would not be subject to review by a higher court); nor does it refer to the power which administrative organs and officials must have to take decisions without reference to higher authority. The real problem of discretionary powers in relation to the R. of L. is *how to limit the powers of government as a whole*. This must be done by denying gov. the power to order citizens about to suit its purposes and authorising it only to induce them to act in the general interests by making them obey general rules. And the R. of L. requires that administrative organs should have no discretionary powers to interfere with the private affairs of citizens.

In the 18th and early 19th cents. the coercive powers of the administration were limited to what the law laid down by subjecting them to the ordinary courts of law. David Hume put the position clearly: 'though some inconvenience arises from the maxim of adhering strictly to the law, yet advantages so much over-balance them, as should render the English forever grateful to the memory of their ancestors who, after repeated contests, at last established that noble principle.' The Continental countries which wished to follow the Eng. example and establish the R. of L. in the early 19th cent. found the problem complex because they had in the meantime evolved powerful administrative machines governed by administrative laws that were beyond judicial control. These administrative laws were concerned more with regulating the decisions of officials towards their superiors than with limiting their powers over citizens. Accordingly, they came to be regarded by Eng. jurists, such as Dicey in the classic *Law of the Constitution*, as arbitrary and the opposite of the R. of L. But it has been argued recently, notably

by F. A. Hayek, prof. of social and moral science in Chicago Univ., that Germany and France had developed safeguards against the arbitrary powers of bureaucracy and that Britain still lacks these safeguards. At first France and Germany subjected public administration to the control of the ordinary courts; but this was found ineffective where the problem was not merely to apply an existing law but to formulate or elaborate principles laid down by the law only in broad outline. The ordinary judges, trained mainly in civil and criminal law, lacked the necessary knowledge and competence. Hence the new solution: special administrative courts. These took shape in France and Germany around 1870; they were intended to be fully independent courts of law, separate from the executive, but different from the ordinary courts only in the kind of cases that came before them. In Britain understanding of the Continental arrangements had discredited the conception of separate administrative courts; but legislation in Britain gradually exempted larger and larger areas of administrative action from judicial review.

In recent years there has been a multiplication of administrative tribunals within the administrative machinery. The great danger is that, although these tribunals follow judicial procedure, they are, in essence, *courts of administrators enforcing a policy, not courts of judges administering the law*. Although the process of removing administrative action from the control of the judiciary led to the impressive protest by Lord Chief Justice Hewart in the 1920s (*The New Despotism*), and although more recently many thinkers have shown themselves aware of the trend, the danger for the R. of L. of the widespread growth in Britain of public administration free from judicial control is not yet sufficiently appreciated to be reflected in political action. Thus while Continental countries have gradually brought their administrative law under the R. of L., in Britain administrative law has been allowed to undermine it.

See also LAW; JURISPRUDENCE; LEGISLATION; INDIVIDUALISM.

See Sir C. T. Carr, *Concerning English Administrative Law*, 1941; F. A. Hayek, *The Road to Serfdom*, 1944, and *The Political Ideal of the Rule of Law*, 1955; C. K. Allen, *Law and Orders*, 1945; G. W. Keeton, *The Passing of Parliament*, 1952; C. J. Hamson, *Executive Discretion and Judicial Control*, 1954.

Rule of the Road. On Land. In Great Britain a vehicle or horse when meeting another vehicle or horse should keep to the left or near side of the road. In most countries of the Continent and in America the R. of the R. is the opposite of that of Great Britain. R.s of the R. in Great Britain are set out in the Highway Code, which includes the following rules. Drivers and riders should keep well to the left of the road, except when overtaking or when about to turn right. They should overtake other vehicles on

the right, except when the driver in front has signalled that he intends to turn right (this rule does not necessarily apply at roundabouts, on one-way roads, or when overtaking tram-cars). Hand signals are prescribed for the driver or rider to give when he intends to move out or turn to his right, turn to his left, slow down or stop, and when he is ready to be overtaken. Vehicles should not overtake, or be parked, at or near hazards such as bends, junctions, and bridges, or at pedestrian crossings. At a road junction drivers and riders should give way to traffic on the major road and not go on until it is safe to do so, although main-road traffic is not legally absolved thereby from its responsibility for taking care. No 'off-side' rule of priority applies in Great Britain as in some countries. Drivers and riders must give precedence to pedestrians on uncontrolled crossings (See ROAD SAFETY; TRAFFIC REGULATIONS); they should show consideration to pedestrians when turning from one road into another, and be prepared to meet them or led animals on their side of the road. Pedestrians should use footpaths; where these do not exist, they should walk on the right of the road to face oncoming traffic. Marching bodies, however, keep to the left, have look-outs, and show lights at night.

At Sea. When 2 sailing vessels are approaching one another, so as to avoid risk of collision: (1) the vessel which is running free must keep out of the way of a vessel which is close-hauled; (2) a vessel which is close-hauled on the port tack must give way to a vessel close-hauled on the starboard tack (starboard denotes the right-hand side looking from aft forward, and port, the left); (3) when both are running free with the wind on different sides the vessel which has the wind on the port side must give way to the other; (4) when both are running free with the wind on the same side the vessel which is to windward shall keep out of the way of the vessel which is to leeward; and (5) a vessel which has the wind aft, i.e. running before the wind, shall keep out of the way of the other vessel. When two power-driven vessels are meeting end on, or nearly end on, so as to involve risk of collision, each shall alter her course to starboard so that each may pass on the port side of the other. This rule applies only to cases in which, in daylight, each vessel sees the masts of the other in a line or nearly in a line with her own, or, at night-time, sees both the side lights of the other. When two power-driven vessels are crossing so as to involve risk of collision, the one which has the other on her starboard side must keep out of the way of the other. A power-driven vessel must keep out of the way of a sailing vessel, except when the sailing vessel is overtaking the power-driven vessel. Power-driven vessels which are directed by the rules to keep out of the way of other vessels must, on approaching, if necessary slacken speed or stop, or reverse their engines. A vessel overtaking any other

vessel must keep out of the way of the overtaken vessel. In narrow channels a power-driven vessel should, when it is safe and practicable, keep to its starboard side of the mid-channel. All vessels not engaged in fishing shall, when under way, keep out of the way of any vessels fishing with nets, lines, or trawls; but this rule does not permit vessels engaged in fishing to obstruct a fairway. When vessels are in sight of one another a power-driven vessel under way, in taking any course required by the above rules, shall indicate that course by sound signals on her

colloquially known as the 'White Book' and the 'Red Book' respectively), which, by the Judicature Act, 1875, were substituted for the Chancery Consolidated General Orders, 1860, and the common law *Regulæ Generales*, were framed by the judges. The power to alter these rules from time to time, as occasion demands, is vested in the Rule Committee composed of the lord chancellor and a majority of judges of the high court. The rules of co. court practice are made and revised by 5 co. court judges appointed for that purpose under the County Courts Act,



Eric G. Meadows

THE CULLIN OF RUM FROM CLEADALE, ISLE OF EIG

whistle or siren. One short blast means, 'I am altering my course to starboard.' Two short blasts mean, 'I am altering my course to port,' and three blasts, 'My engines are going astern.' The above rules are subject to any special rules of local authorities relative to the navigation of harbours or rivers. The rules are contained in the general regulations for preventing collisions at sea and prescribing certain signals of distress (The Collision Regulations (Ships and Seaplanes on the Water) and Signals of Distress (Ships) Order, 1953. S.I. 1953, No. 1557).

Rules of Court. The expression R. of C. denotes the body of rules or orders regulating the practice or procedure of the courts, superior and inferior. The 'Rules of the Supreme Court' (to be found in the Ann. Practice and the Yearly Practice,

1888, by the lord chancellor. Rules of other inferior courts are made subject to the concurrence of the Rule Committee. All R. of C. have the force of statute, but most judges seem fully aware that many of the rules require correlation and revision, and hence interpret them as far as possible in accordance with the dictates of common sense rather than with the demands of forensic technicality.

Rum, is. of the Inner Hebrides, Inverness-shire, Scotland, 16 m. NNW. of Ardnamurchan Point. Its surface is mountainous, the highest point being Halskeval, 2667 ft. It is 8 m. long and 7½ m. wide, and covers an area of 42 sq. m. Pop. (with Elgg) 215 (1951).

Rum, from *rumblution*, a Devon word for 'a great tumult,' also known as **Barbados Waters**, a spirit distilled from

molasses, syrup left over from the refining of the sugar cane. A very little R. of really high quality is still distilled from the fermented juice of the cane before the sugar has been extracted. Jamaica R. is the best of the rich full-bodied R.s; Cuban R. is dry and light-bodied, and the R.s of Demerara, Martinique, and the Dutch E. Indies are more aromatic and lighter than Jamaica R. R. has been a naval ration (*see* Grog) from the 18th cent., and was one of the main exchange counters in the slave trade. Flavoured Jamaica R. for blending is specially fermented to produce a spirit with a paralytically powerful scent. *See* H. Warner Allen, *Rum*, 1931.

Ruma Island, *see* LOS ISLANDS.

Rumania (Romania), republic of SE. Europe bounded on the N. by the Ukraine, on the W. by Hungary and Yugoslavia, on the S. by Bulgaria and the Black Sea, and on the E. by the Black Sea. The greater part of the S. boundary is marked by the Danube. The boundaries of R. have undergone many changes since the first decade of the 20th cent. By the treaty of Bucharest (1913) R. gained a strip of ter. extending from Mangalia to Ekrene on the Black Sea by a line direct from above Turkukal on the Danube. By the peace treaties of 1919 R.'s right to Bessarabia, Bukovina, the E. Banat, the whole of Dobrudja, and Transylvania was recognised. In 1914 the area of R. was 50,710 sq. m. In 1939, as a result of these additions, the total area was 113,884 sq. m. and the pop. had more than doubled, being 19,933,800. In 1940 R. was forced to cede Bessarabia and the N. Bukovina to Russia, S. Dobrudja to Bulgaria, and N. Transylvania to Hungary. R. was in fact bribed by Germany to enter the war against Russia in 1941 by the promise of Bessarabia, N. Bukovina, and an additional area between the Dniester and Dnieper, called Transnistria. In 1941 the reduced R. had an area of 10,254,777 sq. m. and a pop. of 13,551,800. In Feb. 1947, under a peace treaty between R. and the Allies, ratified the following Aug., Transylvania was restored to R. Russia retained Bessarabia and N. Bukovina, and Bulgaria S. Dobrudja. The area of R. was estimated in 1947 at 88,715 sq. m., and the total pop. at about 17,000,000 in 1953.

By the 1952 Constitution R. is divided into 18 administrative provs.: Arad, Bacău, Baia Mare, Birlad, Bucharest, Cluj, Constanța, Craiova, Gălăț, Hunedoara, Iasi, Oradea, Pitesti, Ploesti, Stalin, Suceava, Timisoara, and the Magyar Autonomous Region (cap. Tirgu Mures). The old provs.—Muntania and Oltenia (Wallachia or Tara Romaneasca), Transylvania, Moldavia, Crisana, Maramures Banat, Bucovina, Dobrudja—are of no administrative significance. The chief tns are Bucharest, the cap., pop. 1,042,000; Cluj, 118,000; Timisoara, 112,000; Brăila and Ploesti, 96,000 each; Iasi (Jassy), 94,000 (pops. in 1948). Tns of importance having pops. of less than 90,000 are Arad, Constanta,

Craiova, Gălăț, Oradea, Satu Mare, Sibiu, Stalin, and Tirgu Mures. About a fifth of the pop. live in the tns. All the prin. rivs. flow into the Danube, one, the Pruth, being the boundary with the U.S.S.R. The Danube enters R. through the Kazan Pass with the famous 'Iron Gates' at the E. end, so named by the Turks because of the submerged rocks in the waterway. High rocky mts overshadow the riv. on both sides, clad with pine and birch: as it flows to the sea it widens and gains in depth and the banks gradually level, so that for 290 m. the shore is flat, desolate, and marshy, varied by cities and chains of lagoons. The chief rivs. which join the Danube in Wallachia are the Jiu, the Olt, the Arges, and the Ialomitza. The Siret, rising in the Transylvanian Mts, flows 340 m. through Moldavia and joins the Danube near Gălăț. The Pruth rises in the extreme N. of Moldavia, flows for 330 m. and joins the Danube 10 m. E. of Galati. The whole of the country lies in the Basin of the lower Danube, and consists of a great plain stretching up from the l. b. of the riv. to the Carpathian Mts, beginning with mud flats and a level lowland which joins the lower ridges of the Carpathians and forms the most fertile part of the country. The remainder of the land is rocky, with transverse valleys where alpine plants flourish. The climate is inclined to extremes; spring is very short, and autumn is the mildest season of the year.

Production. The country is naturally agric., and about 45 per cent of the land is under plough; the fertile soil produces good crops of maize, wheat, barley, oats, millet, beans, vines (420,000 acres), tobacco, flax, and hemp. 24 per cent of R. is forest-land, and timber is an important product. Cattle-breeding is on a large scale and also the rearing of sheep and swine. In 1921 agrarian reform transferred 88 per cent of the land in fairly small lots to the peasants. Any remnants of feudalism were speedily eliminated after 1944. After the estab. of the People's Republic steps were taken to develop collective farming. The remaining landowners were dispossessed and disfranchised. The most important mineral product is petroleum, obtained chiefly in the dists. of Bacău, Buzău, Dimbovită, and Prahova. In 1947 3,810,000 metric tons of crude oil were produced; but before the Second World War ann. production had reached (1938) 6,868,000 metric tons, although the labour used was less (23,600 in 1938 and 50,200 in 1947). There are nearly 2000 m. of oil pipeline in R. Before the Second World War foreign capital was largely responsible for the exploitation of R.'s oil resources, but the post-war Communist Gov. systematically took over the ownership of foreign companies. Other minerals include coal, salt, iron ore, gold and silver ore, and mica. Industries of importance are flour milling, brewing, distilling, furniture manuf., and the production of chemicals based on petroleum and lignite

or coal. Before the Second World War Great Britain was R.'s biggest customer. In 1948 trade between R. and Britain revived to some extent: R. exported some £3m. worth of goods to Great Britain and imported £1m., but the bulk of trade was done with the U.S.S.R., Bulgaria, Hungary, and Czechoslovakia. In June 1948 a law, effective upon publication, nationalised insurance, banking, mining, transportation, and telecommunication enterprises, and most manufacturing concerns. The first Five-year plan, 1951-5, aimed at nearly doubling the total production, and this, it is claimed, was almost achieved. The second plan, 1956-60, aims at

About 70 per cent of the pop. belong to the National Orthodox Church. Of the rest the largest minorities are Rom. Catholic, 8 per cent; Reformists and Lutherans, 3.3 per cent. In Aug. 1948 a law 'concerning the freedom of all religions' put all religions and religious teachings under state control. In Oct. 1948 the Uniate church (10 per cent of the pop.) broke with the Vatican and was readmitted to the Orthodox Church. The State pays the clergy of the leading Christian denominations and Moslems, and Jewish communities receive a state subsidy. Education is nominally compulsory and free, but the percentage of



Rumanian Legation

MUNTENIA: TIMBER YARDS NEAR CURTEA DE ARGES

further large increases, the development of heavy industry being of prime importance. In 1945 an agreement between R. and the U.S.S.R. provided for closer economic collaboration between the 2 countries. Rumanian-Soviet companies called *Sovroms* were estab. These gave the U.S.S.R. virtual control over all important Rumanian enterprises. In 1947 *Sovrompetrol* produced nearly 30 per cent of all Rumanian petroleum. The U.S.S.R. had surrendered their interest in most of these companies to R. by Dec. 1955.

Race, Religion, and Education. Before the Second World War the racial divs. of the country were: Rumanians (Vlachs) 72 per cent, Magyars 8 per cent, Germans 4 per cent, Jews 4 per cent, and the remaining 12 per cent were Ruthonians, Russians, Bulgarians, Turks, and Gypsies. During and after the War the number of Magyars, Jews, and Gypsies was considerably reduced, in the case of the last 2 groups by persecution, and by 1948 over 86 per cent of the pop. were Rumanians.

illiterates is still high in the remote parts of Wallachia and Moldavia. There are univs. at Bucharest (founded 1864), Iasi, Cluj, Timisoara, and Tirgu Mures. The 2 last-named were founded in 1945 to replace Cernăuți (Czernowitz, Chernovitsy) univ. when C. was ceded to the U.S.S.R. Church schools were put under state control in 1948. There were in 1952 over 15,500 primary and in 1945 nearly 1000 secondary schools.

Constitution and Justice. The Rumanian People's Republic was proclaimed on 30 Dec. 1947. Elections for the Grand National Assembly in Mar. 1948 gave 405 out of 415 seats to the Communist-controlled bloc. A new constitution was passed, instituting gov. by a single chamber, a council of ministers, and a praesidium. Women voted for the first time in the elections of Nov. 1946. A new constitution was passed on 24 Sept. 1952. Justice is administered through a supreme court, 18 regional courts, and the people's courts.

Communications. The State owns and operates all the main railways, owning 7400 m. in 1949. Total road mileage in 1950 was 43,363. In 1945 the Rumanian Airways Company was incorporated in a Russian-Rumanian joint company. It had transported more than 12,000 passengers in 1944. There are services linking Bucharest with Warsaw, Istanbul, and Belgrade. In 1948 Rumanian mercantile tonnage amounted to 32,962 tons, being still reduced to below its pre-war strength by war losses and reparations. The State Navigation Service covering sea and Danube navigation was incorporated in a Rumanian-Russian joint company (*Sovromtransport*) in 1945. It was returned to Rumanian control in 1954. The peace treaty (1947) laid down that Danube navigation should be free, equal, and open to all nationals, mercantile vessels, and trade of all states. Gălăți is the timber port. Brăila deals primarily with grain, and Constanța with petroleum.

Defence. Under the peace treaty of 1947 R. was allowed a land army not exceeding 120,000 men; anti-aircraft artillery up to 5000 men; an air force not exceeding 150 aircraft and a personnel of 8000; and a navy of up to 15,000 tons with a personnel of 500. In 1954 it was believed that the Rumanian army alone had a strength of 250,000. There is a naval school at Constanța.

History. The primitive civilisation of R. can be traced back to the Neolithic age; prehistoric remains have been found at, e.g. Vodastra. The Rom. period left its mark deep on the country, and many towns and ruins have been identified. The period immediately preceding the conquest by the Romans belongs to those people known as the Daci or Getae (q.v.), who occupied the country until the Emperor Trajan defeated their king Decebalus in AD 106, and their country became a Rom. prov., known as Dacia. Rom. colonists settled in the country and it became an exceedingly flourishing part of the Rom. Empire. About AD 275 the Emperor Aurelian withdrew his garrisons, but the Rom. civilians remained. From the 6th to the 12th cents. the country was invaded by various barbarians, Goths, Tatars, Huns, Bulgarians, and Magyars, almost obliterating the Daco-Rom. inhab., though remnants of Rom. civilisation and the Rom. language survived. The modern Vlachs are possibly a remnant of the original Daco-Romans, mingled with the later body of immigrants from Trans-Danubian ter. At the end of the 13th cent. Wallachia and Moldavia were occupied by a mixed race of Tatars, Vlachs, and Slavs. These 2 principalities developed separately. The Wallachian state was, according to tradition, founded by Rudolf the Black, known as the Black Prince, in 1290, who finally estab. his cap. at Ompulung. Wallachia under Rudolf was still a vassal of the Hungarian crown, but in 1330 the voivode or prince, John Bassarab the Great, inflicted a crushing defeat on King Charles I of Hungary, and enjoyed independence

for just 14 years; then Louis the Great asserted his supremacy. Of the more famous voivodes of Wallachia, Mircea the Great (1386-1418), who fought so bravely against the Turks, ended by being obliged to recognise their suzerainty. During the succeeding period the Wallachian princes became either allies of Hungary or under the rule of Turkey. For a short time the country became independent under Michael the Brave (1593-1601). Michael secured his own nomination as voivode, and by his courage and genius united under his rule the 3 principalities



A YOUNG PEASANT OF MARAMURES

of Wallachia, Moldavia, and Transylvania. For the first time since Trajan's conquest the whole of the original Dacia was complete as 1 kingdom. Subsequently Transylvania revolted and, with the co-operation of the imperial gen., Basta, drove him out of the country. Michael appealed to the emperor, who appointed him Governor. So Basta now helped him to expel Andreas Bathory, who had secured control, but later Basta treacherously murdered Michael. Matthias Bassarab (1633-54) estab. a certain amount of peace and prosperity, and repulsed his rival, Basil the Wolf, of Moldavia. Bassarab's illegitimate son, Constantine Serban (1654-8), was the last of the Bassarab dynasty to rule Wallachia; at his death Turkish rule again governed the country. The cap. was moved from the old city of Tirgoviste to Bucharest, which became the seat of government in 1698. The hist. of Moldavia had developed on much the same lines as Wallachia. The country

recognised the suzerainty of Poland under the voivode Alexander the Wise (1401-33); his grandson Stephen the Great (1458-1504) defeated the Poles (1461), the Hungarians (1467), and invaded Wallachia (1476); but his successor, Bogdan, acknowledged Turkish suzerainty. Demetrius Cantemir was the last of the national princes (1709-11); then followed the Fanariot period which lasted in both principalities till 1821. The voivodeship was sold to the highest bidder by the Turks, and the holders were generally Fanariots (q.v.), often men of culture and intelligence, having most enlightened ideas. Nevertheless, during this time the country suffered much misery and misrule both from its own princes and the greed of Russia and Austria. In 1821 the Porte once more allowed them to elect their own rulers, but Russia for a time prevented any serious reforms. The treaty of Paris (1856) gave the principalities the guarantee of the powers to preserve their existing privileges while still remaining under the suzerainty of the Porte. In 1858 it was decided that both Moldavia and Wallachia should have separate assemblies, but that a central commission be estab. at Ploesti for common justice and interest. Both assemblies were to elect their own prince—they chose unanimously Prince Alexander John Cuza (Jan. 1859), and thus the union was satisfactorily accomplished. In 1866 Prince Alexander was compelled to abdicate, his reforming policy being unpopular with the landowners; Prince Charles of Hohenzollern-Sigmaringen (b. 1839) was elected in his place. A new and more liberal constitution was adopted, reforms were made in the Army, and railway construction was begun. An abortive rebellion broke out in 1870 due to R.'s sympathies with France and in opposition to a Ger. prince; further, a financial crisis developed in connection with the railways and a failure to pay interest on the loan which was mainly held by Ger. investors. Prince Charles threatened to abdicate, but the elections of 1871 restored his gov. to power and the crisis passed. R. played an important part in the negotiations between Russia and Turkey which ended in the Russo-Turkish war of 1878, and finally threw in her lot with Russia. The treaty of Berlin (q.v.) gave R. her independence, ceding Bessarabia to Russia and gaining the delta of the Danube and the Dobruja. R. was formally recognised as independent in 1880, and in 1881 elevated to the position of a kingdom; in 1885 the church of R. was declared a separate national church. Domestic politics continued to be disturbed by religious disputes and peasant grievances. During the Balkan war (1912-13) R. played a strong waiting game, and on the outbreak of hostilities between the former allies, Bulgaria and Greece plus Serbia, she mobilised her army and compelled Bulgaria to consent to the terms of the treaty of Bucharest, by which she gained the S. Dobruja.

At the outbreak of the First World War

R. declared neutrality, Premier Brătianu, the Liberal leader and chief influence in Rumanian politics between 1909 and 1927, cautiously favouring the Allies and the court favouring the Central Powers. In Oct. 1914 King Charles died and was succeeded by Ferdinand. Regarding Transylvania and Bukovina, which R. wished to annex, agreements were reached with Russia and R. declared war on Austria-Hungary (27 Aug. 1916). The Rumanian troops won Transylvania, but the Ger. Army advanced from Silistria and on 6 Dec. entered Bucharest (see RUMANIAN FRONT, FIRST WORLD WAR CAMPAIGN ON). In Dec. 1917 R. was included in the agreement between Germany and Russia to suspend hostilities. In Jan. 1918 friction between Russia and R. in Moldavia led to a declaration of war from Russia, but Russia was occupied with renewed hostilities with Germany. The Rumanian Premier, Averescu, signed the treaty of Bucharest with Germany, but later R. declared war. On 10 Nov. Brătianu returned to power. Rumanian deaths due to the war numbered 325,000 soldiers and 275,000 civilians. On 4 Aug. 1919 Rumanian troops entered Budapest, retreating, upon allied representations, after much looting. Under the Populist Premier Averescu, R. signed the Little Entente (1921) with Czechoslovakia and Yugoslavia. There was drastic agr. reform. In 1923 Brătianu was again in power, and a new constitution was adopted, attempting to establish fairer elections by the introduction of the secret ballot. There was a treaty of friendship made with Italy in 1926. Ferdinand died in July 1927, and was succeeded by his 5-year-old grandson, Michael, since his son, Carol, had renounced his titles in 1925 and been exiled. Brătianu's power was now apparently very great, but in fact there was much unrest among the minorities and the peasantry, and these factors contributed to the rise to power of the National Peasant party led by Maniu. Brătianu d. in Nov. 1927, and in the elections which followed Maniu's party was returned, the Liberal strength falling from 293 seats to 13. In 1930, with Maniu's help, Carol returned and the Council of Regents resigned. Carol became king from 9 June, his son Michael becoming Crown Prince. R. was hard hit by the world economic crisis. Maniu soon quarrelled with Carol, and there was a swift succession of govts., each arranging elections in its own favour under the electoral laws of 1926. In 1933 a non-aggression pact was signed with Russia. Ger. influence in R. became more marked, being exercised partly by the intervention in gov. affairs of Codreanu's Iron Guard, the Rumanian parallel to the Ger. S.S. This adopted anti-semitism, a sentiment never far below the surface in R., to gain popular support. When Iron Guard activities were renewed in autumn 1938 Codreanu and a number of other Iron Guard leaders, were taken and strangled, but this did not secure control of the guard's activities. In 1939 R. remained

aloof from the War, but showed some pro-Polish sympathies. In Mar. 1940 the Iron Guard was restored under Ger. pressure. R. was forced to cede Bessarabia and N. Bukovina to Russia in July, S. Dobruja to Bulgaria on 21 Aug. and N. Transylvania to Hungary on 30 Aug. On 6 Sept., following a *coup d'état* by the Iron Guard, Antonescu, with Ger. support, formed a gov., and Carol was forced to abdicate in favour of his son and flee the country. Ger. troops were stationed in R., and the economy of the country was used to supply the Ger. war machine. In revenge for the execution of Codreanu the Iron Guard arrested and executed a number of prominent Rumanians, including Prof. Jorga (q.v.), and then carried out a merciless anti-Jewish pogrom. Antonescu was forced to disband the guard, doubtless with the consent of his Ger. overlords. R. joined in the Ger. invasion of Russia in 1941. More than 40 Rumanian divs. took part, serving in the severe fighting of the Crimean campaigns, where their losses were very heavy. For a time they reconquered Bessarabia and N. Bukovina, and in Oct. 1941 a decree was issued incorporating Odessa and an area beyond the Dniester in R. By the end of 1944 Russia had won back all this ter. R.'s brief successes cost her dearly. Ploesti, Bucharest, Iasi, and Constanta were repeatedly bombed by the Russians, and in Dec. 1941 Britain declared war on her. From 1943 allied bombers attacked Rumanian towns from its bases. The war became extremely unpopular, and Antonescu was compelled to exercise severe repressive measures. At the same time desperate efforts were made by the Germans to increase production in the oilfields. In Aug. 1944 the Russian counter-offensive reached Iasi and Constanta, and an armistice was signed on Russian terms. King Michael, although virtually a prisoner of the Germans, taking a notable part in the events leading to the surrender (see further under EASTERN FRONT OR RUSSO-GERMAN CAMPAIGN IN THE SECOND WORLD WAR). Antonescu was imprisoned and executed as a war-criminal in 1946. There were a number of attempts at coalition gov., but in Mar. 1945 the National Democratic Front, with Russian backing, assumed power, under Grozea, leader of the Ploughman's Front, a Communist offshoot of the Peasant party. The National Democratic Front was nominally a left-wing coalition, but it was in fact Communist-controlled. The Communists were a minority party in R., but Russian support soon assured them control of the country. Elections in Nov. 1946, at which the registers were alleged to have been falsified, gave 348 members to the Grozea gov. and 29 to the opposition groups. The opposition parties, the National Peasant party and the National Liberal party, were liquidated. Maniu was sentenced to solitary confinement for life. All pretence at coalition gov. ended when the Liberal members of the gov. were replaced by members asso-

ciated with the Workers' party, the name given to the fused Social Democrats and Communists. The reconstituted gov. forced Michael to abdicate on 30 Dec. 1947. The National Assembly proclaimed R. a republic on the same day. In Mar. 1948 elections were held in which the Communists gained an overwhelming victory. A new constitution was passed, which by its form consolidated the power of the Communists (see further under *Constitution and Justice*). A peace treaty had been signed in Paris in Feb. 1947. The frontiers were fixed as on 1 Jan. 1941, with the exception that Transylvania was restored to R. Reparations to Russia, to the value of £75 m., were to be paid over a period of 8 years, but the Soviet Union later waived her claim to much of this. The treaty contained clauses specifying that Rumanians should enjoy full personal liberties. In April 1949 the U.S.A. and Britain protested that the Rumanian Gov. had suppressed these liberties and had thus violated the peace treaty. R.'s foreign policy was closely in line with that of the U.S.S.R., and in 1949 she joined in the Soviet campaign against Tito. At home the gov.'s actions showed that it was the intention to establish a fully Communist R., and nationalisation on a large scale has been carried out. In 1952 a new constitution further consolidated the Communist grip on the country, and the dismissals from office of Ionescu, Georgescu, and Ana Pauker were also indicative of the growing Soviet grip even on the native Communist element in the country. R. appears (1957) to be a complete satellite of the U.S.S.R. The reaction against Soviet influence in Poland and Hungary in 1956 appears to have had little or no effect in R., where any attempt at opposition or criticism can be immediately stifled by a powerful political police force. It is certain that democracy as understood in W. Europe has never taken root in R. The condition of the peasantry and of the urb. workers had been improving steadily since the end of the 19th cent., but much injustice and political corruption and discrimination had survived, and on these grievances the minority Communist party had thrived. The rapid collapse of the historical parties, which had been based on W. European parl. tradition was accomplished so easily, not only because Soviet power was available, but also because so large a proportion of the pop. were politically ignorant.

Language and Literature. The Rumanian language is a Romance language (see under ROMANCE LANGUAGES), curiously isolated among the Slavonic and Magyar-speaking peoples. Therefore, words of Lat. origin mingle with Serbian, Bulgarian, Russian, and Hungarian intruders, and even with the Turkish, Gk. and Albanian, and the Romance character of Rumanian has been much modified, particularly by the Slavonic loan-words and certain characteristics apparently inherited from the language previously

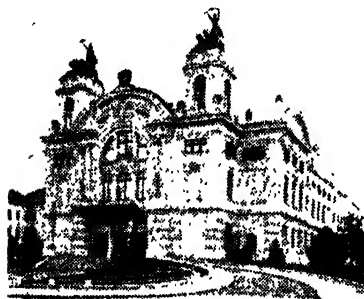
spoken in the area. On the other hand, certain characteristics of the Lat. language have been better preserved in Rumanian than in any other Romance tongue, both in the vocabulary and in grammar. Rumanian has retained, for instance, a separate nominative-accusative and genitive-dative, as well as occasional vocative forms. A feature of the language, common to Bulgarian and Albanian, is an article-suffix added to nouns. The Cyrillic alphabet was used until the 19th cent. when it was gradually replaced by a Latin alphabet expanded by diacritic marks.

Early Rumanian literature consists of trans. from the Slavonic, and from the 16th to the beginning of the 18th cent. Slavonic influence is supreme, though under the pressure of the Reformation tendencies leading towards a truly national literature begin to appear. Of importance are the chronicles of Moldavia by Nestor and Gregorie Ureche down to 1594, by Miron Costin to 1662, and by Necula Costin (d. 1715) to his own date; of Wallachia, by Capitanul to 1688, by Popescu to 1720, especially by Prince Demetrius Cantemir (1710). The Gospels were published in lt. in 1560-61 (the first printed R. book), but the first complete trans. of the N.T. from Slavonic, appeared in Alba Iulia 1648; the first complete Bible was pub. (1688) by Radu and Șerban Greceanu, at the order of Prince Cantacuzene. Under the influence of the Reformation a large mass of trans. homilies, sermons, verse paraphrases of the psalms, etc., was pub. during the 16th and 17th cents. During this period the liturgies which were all in Slavonic, began to be trans., though the Cyrillic alphabet continued to be used. Of importance and interest are the trans. from Greek, Slavonic, and Magyar of lives of the saints, maxims, and ethical treatises. The Fanariot period (1710-1830) marks the rise of Gk influence. By this time Rumanian had become the official language of the church, and in 1727 became the language of the law courts. Rumanian trans. of the Gk fathers of the church and much theology appeared. During and after the Fr. revolutionary period the growth of nationalism in R. influenced, and was influenced by, a group of writers, mostly Transylvanian, who included Peter Maior, George Sincai, Samuel Klein (Micu), and George Lazar. They worked to latinise their language, and to incorporate much of the folk-literature into forms which owed much to W. European, and especially Fr. influence. Lazar's pupil Eliade (q.v.) led the literary renaissance in the 1820s and 1830s, but then his excessive latinising lost him his influence. He had encouraged the poets Cârlova, Bolintineanu, Alexandrescu (q.v.), Russo, Negruzzi, and the historian (and politician) Kogălniceanu (q.v.). Alexandrescu represented not only the triumph of Fr. influence but also the growing interest in the speech of the people. This interest helped to unite the Wallachian and Moldavian literatures

—a union that was the more encouraged as the forerunner of political union. Kogălniceanu supported it keenly in his review *Dacia literară*. Russo and Negruzzi were of the same views, while Alecsandri (q.v.) and Bolintineanu were mainly governed by the Fr. influence. The wane of this influence is signalled by the formation, by T. Maiorescu, of the literary group *Junimea*, in 1865. *Junimea* aimed at a more balanced, independent literature. Maiorescu's most important discovery was Eminescu (q.v.), R.'s greatest poet. Among Eminescu's successors may be counted Al. Vlahuța and Cosbuc (q.v.). Others belonging to *Junimea* were Creangă (q.v.), the peasant author, and I. I. Caragiale (q.v.), the satiric dramatist and story-writer. Delavrancea the dramatist and D. Zamfirescu, poet and novelist, should be mentioned. The foundation of the review *Sămănătorul* (1901) soon taken over by Iorga (q.v.) marked a new trend, a return to native tradition and the complete rejection of foreign influences. Here may be mentioned Sadoveanu, Agărbiceanu, Galaction the mystic, Drăgoslav, a recorder of peasant life, and D. Anghel, whose poetry in some ways anticipates that of the symbolists. This movement and a related one, *Poporismul*, were opposed by Zamfirescu, Macedonski, and Densusianu, prof. and symbolic poet. Between the wars Fr. influence was predominant. Rumanian literature was divided between traditionalists, e.g. Hebraum, Crainic, and M. Sadoveanu, and modernists, e.g. Papadat-Bengescu, Minulescu the poet, and T. Arghezi, one of the most technically finished poets. Among modernist dramatists were Ion Barbu, G. M. Zamfirescu the surrealist, and Minulescu the poet. The sparse literature of the period after 1945 shows strong Russian influence, both in subject-matter and treatment. There has been an increase in sociological writing: fiction and poetry, where not actively propagandist, show a greater reliance on folk literature than was displayed by writing done when contact with W. Europe was easier.

Art. Rumanian church architecture was until the 19th cent. predominantly Byzantine, though in some parts of the country, such as Transylvania, Magyar and Ger. influences have produced buildings with certain Gothic tendencies. The richly decorated interiors and the icon paintings follow the Byzantine pattern. Metalwork decoration is lavishly used. The 18th-cent. interior of the monastery church at Văcărești, and the impressive 16th-cent. monastery church at Humorului are good examples of Rumanian art of this type. Ger. influence, where it exists, is more noticeable in the exteriors of church buildings. R. was affected by the classical fashion in architecture which spread across W. Europe in the early 19th cent., and her later buildings are largely copies of Fr. and Ger. styles. Building between 1910 and 1939 showed Amer. influence. Rumanian painting also followed the By-

zantine tradition until the late 18th cent.: modern Rumanian art owes much to Fr. Impressionism. The 20th cent. produced a school of Rumanian painters who, while strongly influenced by Fr. tendencies, combined these with ideas and styles taken from Rumanian peasant art, which is notable for its exotic, almost oriental, colour combinations. Prominent Rumanian artists include N. Grigorescu (q.v.), I. Theodorescu, I. Andreescu, and the sculptor I. Jalea. Modern Rumanian pottery and glasswork is remarkably fine, and incorporates many folk-designs.



Rumanian Legation

THE NATIONAL THEATRE, CLUJ

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Rumanian Front, First World War Campaign on. The sympathy of Rumania was with the Entente from the outset of the war, but Ger. successes on almost every front, and particularly within easy reach of her frontier, imposed great caution upon her. However, on 27 Aug. 1916 she declared war on Austria-Hungary. Rumania had coveted Transylvania for a long time, and now her troops crossed the Carpathian Alps into the ter., driving the enemy before them. The Bulgarians, however, were preparing for a descent on Rumania, and on 3 Sept. successfully crossed the Danube and captured over 21,000 Rumanians. The Rumanians were compelled to withdraw along their whole line. More trouble was in store for the Rumanians who had penetrated into Transylvania, for a Ger. army was soon concentrated against them. On 28 Sept. a battle was fought at Hermannstadt (Sibiu); the Germans practically destroyed their enemies, all their artillery falling to them. The remnant of the Rumanian force retreated hurriedly over the Carpathians. They were again defeated by the Germans when covering Bucharest. For all practical purposes the Rumanian Army ceased to exist at the beginning of 1917. The remnant was reorganised under the French, and later fought more successfully in conjunction with Russian forces. See also WORLD WAR, FIRST.

Rumansh, see ROMANSCH.

Rumba, dance originating in Cuba, deriving from the *habanera*. It shows Sp., negroid, and Amerindian influence. In its primitive form it was an erotic dance. In ball-room form it was introduced into the U.S.A. between the 2 world wars, and became popular in Britain during the Second World War.

Rumbek, small tn in the prov. of W. Flanders, Belgium, 9 m. NW. of Courtrai, engaged in agriculture and manufs. of linen. Pop. 8300.

Rumelia ('The land of the Romans'), name given by the Turks to a dist. in the Balkan Peninsula corresponding to Thracia and part of Macedonia (q.v.). Eastern R. was made an autonomous prov. of Turkey by the congress and treaty of Berlin (q.v.) in 1878. In 1885, however, it was incorporated in Bulgaria, where it is now included in the provs. of Plovdiv, Khaskovo, Stara Zagora, and Burgas (q.v.). The area of Eastern R. was 17,375 sq. m.

Rumex, family Polygonaceae, genus of about 150 species of annual, biennial, and perennial herbs of temperate regions. Those found in Britain include *R. acetosella*, Sheep's Sorrel; *R. acetosa*, Sorrel; *R. alpinus*, Monk's Rhubarb; *R. crispus*, Curled Dock; *R. obtusifolius*, Broad-leaved Dock; *R. pulcher*, Fiddle Dock; *R. sanguineus*, Red-veined Dock; *R. rupestris*, Shore Dock; *R. maritimus*,

Golden Dock; *R. hydrolapathum*, Great Water Dock; and others. *R. patens* is Herb Patience.

Rumford, Count, see THOMSON, SIR.

Rumi, see JALAL UD-DIN.

Ruminants, ungulate mammals which chew the cud. The paunch is filled with bulky food, which is made into small pellets or boluses and passed to the second stomach, where the fine portions after sifting are carried to the third stomach, the rest being returned to the mouth to be masticated until fine enough for assimilation. Cattle, sheep, goats, deer, antelopes, giraffes, and camels are among the R.

Rummy, card game, played by sev. persons, and has a large number of variations. It is always based on the principle that the player attempts to obtain, from the hand dealt to him, and from the pack, certain scoring combinations, either of the same denomination (e.g. 3 or more kings) or in sequences of the same suit (e.g. 5, 6, 7 of hearts). Sets and sequences are usually declared during play, and the first out wins.

Rump Parliament, see LONG PARLIAMENT.

Runch, see CHARLOCK.

Runciman, Steven (James Cochran Stevenson) (1903-), historian, a son of the 1st Viscount Runciman of Doxford, educ. at Eton and Trinity College, Cambridge. His academic posts include the chair of Byzantine art and hist. at Istanbul Univ. 1942-5; and from 1953 to 1954 he was Waynflete Lecturer at Magdalen College, Oxford. His contributions to Byzantine hist. are outstanding, and pubs. include *Byzantine Civilization*, 1953, *The Eastern Schism*, 1956, and *A History of the Crusades in 3 vols.*, 1951-4. He was knighted in 1958.

Runciman of Doxford, Walter Runciman, first Viscount (1870-1949), statesman and shipowner, b. S. Shields, eldest son of the 1st Baron R. After leaving Trinity College, Cambridge, he entered his father's shipping business. In 1899 he was returned as Liberal M.P. for Oldham. In the 'khaki' election of 1900 he lost his seat, but in 1902 was elected for Dewsbury. In Campbell-Bannerman's gov., in 1905, he was parl. secretary to the Local Gov. Board. This was soon followed by the financial secretaryship to the Treasury. He entered the Cabinet in 1908 as president to the Board of Education. From 1911 until 1914 he was president of the Board of Agriculture and was then promoted to the critical position of president of the Board of Trade. When, in 1924, he won the Swansea seat, he and Lloyd George were the only two survivors on the Liberal side of the chief members of the pre-war Liberal gov. R. accepted a peerage in 1937 before the death of his father, who had himself a peerage conferred on him in 1938. In the late summer of 1938 he was offered the responsibility of adjudicating on Ger. and Czech claims in the Sudetenland, a thankless and impossible task (see also under CZECHOSLOVAKIA). In recognition of his

work, R. was readmitted to Cabinet rank as lord president of the council, an office which he held until the outbreak of war in 1939. He wrote *Liberalism as I See It*, 1927.

Runcorn, port and urb. dist. of Cheshire, England, on the Mersey, 27 m. SW. of Manchester. It is on the Bridgewater and the Manchester Ship canals, and has large docks, accommodating a number of vessels. It manufs. chemicals, tans leather, and has shipbuilding yards. The Mersey near this tn is crossed by railway and transporter bridges. Pop. 24,350.

Rundle, Elizabeth, see CHARLES, MRS E. 'Rundschau, Deutsche,' see DEUTSCHE RUNDSCHAU.

Rundstedt, Karl Rudolf Gerd von (1875-1953), Ger. soldier, b. Aschersleben, Upper Saxony. He entered a Cadet school in 1888, later going on to the Military Academy, Hanover. On passing out in 1893, he joined the 83rd Infantry. He held a succession of staff appointments during the First World War. After that war he continued to serve in the Reichswehr, and by 1932 had become commander of Group I (Berlin), a command comprising sev. divisions. This appointment he held until 1938, when he retired. He was recalled at the outbreak of war in 1939, and was given command of Army Group South on the Polish front. On the completion of the campaign he was made commander-in-chief East and Military Governor of Poland. Before the end of 1939 he took over the command of Army Group A in the West and directed its operations during the campaign of 1940. In 1941 he resumed command of Army Group South serving in the East. During the Russian campaign of 1941 the forces under his command reached the approaches to the Crimea. At the end of that year, however, he retired on the grounds of ill health. In Mar. 1942 he was recalled to become commander-in-chief West, an appointment he was still holding when the Allied landings took place in June 1944. He was replaced by von Kluge in July 1944, but was reinstated in Sept. and continued to serve until Mar. 1945, when Kesselring took over from him. See life by G. Blumentritt, Eng. trans. 1952.

Runeberg, Johan Ludvig (1804-77), Swedish-Finnish poet, b. Jakobstad. He studied at Vasa and Åbo Univ., and in 1837 became lecturer in Latin and later in Greek at Borgå. He founded the *Helsingfors Morgonblad* (1832), contributing to it many of his poems and tales. Among his finest works are the idylls *Elgskyttearne* (Elk Hunters), 1832, *Hanna*, 1836, *Julvännen* (Christmas Eve), 1841, and romances *Nadeschda*, 1841, and *Kung Fjalar*, 1844. His epic *Fänrik Ståls Sägner*, 1848, 1860, dealing with the War of Independence against Russia (1808-9), is perhaps his most famous work, and the prefatory *Vårt Land* has been adopted as Finland's national hymn. R.'s 'poetic realism' had great influence both in Finland and Sweden. *Selected Poems* in Eng. trans. by Magnusson and

Palmer was pub. in 1878. See I. A. Hekkel, *J. L. Runeberg* (2 vols., 1926, W. Söderhjelm, *J. L. Runeberg, hans liv och hans dikning* (2 vols.), 1929, F. C. Runeberg, *Anteckningar om Runeberg*, 1946).

Runes. This term, connected with the old Germanic root *run-* and the Gothic *runa*, meaning 'mystery', 'secret', 'secrecy', indicates an auct script, which may be considered as the 'national' writing of the pre-Christian Germanic tribes, though R., although in limited use, lingered on for a long time after the introduction of Christianity, and their use for charms and memorial inscriptions lasted into the 16th cent. (in some outlying Swedish regions, even 'down to our own times'—O. von Friesen). The origin of the name is probably due to the fact that, like all primitive peoples, the Teutons attributed magic powers to the mysterious written symbols.

The R. were used chiefly for inscriptions (q.v.), of which there are about 4000 extant; amongst the oldest is the Tune stone from Østfold in Norway (c. AD 400). Other inscriptions occur on rings, medals (the characteristic *bracteates* or circular pendants of thin gold), brooches, coins, hilts and blades of swords, perpetual calendars (known in Norway as *Primstaves* and in Denmark as *Rimstocks*), crosses, etc. There is no certain evidence of wide literary use of R. in early times, but some scholars hold that the R. were widely employed for all kinds of secular documents. The MSS. extant, however, are very rare and rather late. The earliest MS. version of Old Eng. R. is now MS. 17 in the library of St John's College, Oxford, dated c. 1100; the Old Dan. *Codex Runicus*, a legal MS., dates from the end of the 13th cent.; the so-called *Fasti Danici* belong to c. 1348. Other important Runic MSS. are the *Codex Sangallensis* 878, at St Gallen; the *Codex Salisburgensis* 140, at Vienna; a Runic prayer-book, etc.

It seems most probable that the R. derived from a N. Etruscan alphabet (see ALPHABET) and originated in the 2nd or 1st cent. BC, but there are many rival theories. The following main varieties of R. may be distinguished: (1) The Early or Common Teutonic or Primitive Norse—about 100 inscriptions, mainly from the 3rd to 8th cents. AD; the Runic alphabet, also called *futhark* (from its first 6 letters), consisted of 24 letters, divided into 3 groups known as *ættir*, and seems to have covered adequately the sounds of the early Germanic forms of speech. (2) The A.-S. or Anglian R., brought to these is. in the 5th-6th cents.; the Early Teutonic R. were not sufficient to represent the rich O.E. vowel system, and the *futhark* was first increased to 28 letters, and in the middle 9th cent. to 33 letters; also the phonetic values of some characters have changed; 2 of the A.-S. R. (the *thorn* and the *wynn*) lingered on in the O.E. alphabet. (3) Nordic or Scandinavian varieties—the parallel linguistic development of the Scandinavian lan-

guages produced a result directly opposite to that of O.E.; from about AD 800 the Scandinavian R. were reduced to 16 letters; we can distinguish a few varieties, such as the Dan. (also used in SW. Sweden), the Swedish-Norwegian, the Haelings R., the Manx R. (which was a sub-variety of the Swedish-Norwegian short system, the Dotted R. or *Stungnar Rúnir*, etc.). There were also various Runic cryptic varieties, such as *hjaldrúnir* or 'tent-runes', *kvistúnir* or 'twig-runes', various kinds of 'bind-runes,' and so forth.

See G. Stephens, *The Old Northern Runic Monuments of Scandinavia*, 1866-84, and *Handbook of the Old Northern Monuments*, 1884; L. F. A. Wimmer, *Die Runenschrift*, 1887; B. Dickens, *Runic and Heroic Poems*, 1915, and *The Runic Inscriptions of Maeshowe*, 1930; M. Cahen, *Origine et développement de l'écriture runique*, 1923; Otto von Friesen, *Rúnorna*, 1933; H. Shetelig, H. Falk, and E. V. Gordon, *Scandinavian Archaeology*, 1937; J. Blomfield, *Runes and the Gothic Alphabet* (Saga-Book of the Viking Society, vol. xii), 1941; A. Arntz, *Handbuch der Runenkunde*, 1944; L. R. Jacobson and others, *Runic Inscriptions of Denmark*, 1947; J. G. Février, *Histoire de l'écriture*, 1948; D. Diringer, *The Alphabet* (2nd ed.), 1949; R. Derolez, *Runica Manuscripta*, 1954.

Runge, Philipp Otto (1777-1810), Ger. painter, b. Wolgast, Pomerania. He studied in Copenhagen and Dresden, and settled at Hamburg. Influenced by the Romantics, he is noted for the melancholy gravity of his portraits, and some symbolic pictures of angels and fairies.

Runner, long sub-aerial shoot rising in the axil of a radical leaf and producing a new plant at its extremity, when the connecting shoot dies. A familiar example is the strawberry plant.

Runners, Scarlet, see BEAN.

Runnimede, or **Runnymede**, meadow on the Thames, near Egham, in the co. of Surrey, England, where the barons forced King John to sign Magna Carta on 15 June, 1215. It was presented to the National Trust in 1931. In 1957 a memorial was erected here at the expense of members of the Amer. Bar Association to commemorate the signing of Magna Carta.

Running and Hurdling. Running is divided into track and cross-country running. Track-running can further be subdivided into sprinting, middle, and long-distance racing. The 2 main sprints are the 100 and 220 yds and an all-out effort during the whole of the race is necessary. The term 'sprinting' means the action of a runner when moving at top speed, and can seldom be maintained for more than 300 yards. In such short races it is necessary to get as good a start as possible, and the quickest method is universally regarded as a crouching start, starting blocks being used to gain impetus. Middle-distance running begins roughly with the 1-m., and extends to the 3 m. In the 1-m. race there are 2 differing points of view as to the way

the race should be run. The first is that the runner should go almost all-out for the first half of the race, then slow down to some extent, in order to make a final effort over the last 100 yds. The second is to run an even-paced race all through, with a strong finish. In the 1-m. a strong start and finish are very important factors, and a fast but steady run in the intermediate stage. The 1-m. race is the most popular of the middle-distance events, and the 4 main requisites are stamina, judgment, speed, and style. There are different schools of thought about whether the first half of the race should be the faster. Roger Bannister, who in 1954 was the first man to achieve the ambition of all middle-distance runners by completing a mile in under 4 min. favoured a faster first $\frac{1}{4}$ mile. The lap times on that great occasion were: 57.7 sec.; 1 min. 58.2 sec.; 3 min. 0.5 sec.; 3 min. 59.4 sec. The crucial lap is always the third. In less than 3 years after Bannister's feat 9 other men broke 4 min. for the mile, and subsequently 4 min. miles became of frequent occurrence. Long-distance running is over distances from 3 m. to 26 m. 385 yds (the Marathon distance). A long-distance runner needs a strong heart and lungs, and plenty of stamina. The main object of style is to eliminate all unnecessary effort.

Hurdling. Although running and jumping are mentioned in Walker's *Manly Exercises*, 1834, the 2 sports were not combined into the one in a hurdling event until the first Oxford and Cambridge meeting in 1864. There was then a steeple-chase, later replaced by a 2-m. flat race, and also 2 hurdle races over 120 and 200 yds. The latter was abolished in 1865, but a 200-yds low hurdle race was introduced in 1922. World hurdling records are recognised for the 120, 220, and 440 yds, and the 110, 200, and 400 metres. For women 80 metres. The standard high hurdle for the 120 yds is 3 ft 6 in. in height, and 4 ft in width, and the 10 flights of hurdles are placed at intervals of 10 yds, with 15 yds from scratch to the first hurdle, and from the last hurdle to the finish. The 220 yds low-hurdle race is run over 10 flights of hurdles, 2 ft 6 in. in height, and spaced at intervals of 20 yds. The height of the hurdle in the 440 yds race is 3 ft, with a distance of 40 yds between each hurdle, with 50 yds from scratch to first hurdle and 30 yds from last hurdle to finish. The straight-leg method of hurdling is now universal, the advantage being that it preserves the running attitude, and makes the hurdle race a sprinting more than a jumping race. For R. and H. records see also **ATHLETICS** and **OLYMPIC GAMES**. See *Athletics* by members of the Achilles Club, 1955; Franz Stampfl, *On Running*, 1955.

Runólfsson, Jón (1856-1930), Icelandic poet who spent the greater part of his life in Canada, noted for his successful translations from Scandinavian, Amer., and Eng. poets, particularly Tennyson.

Runrig Lands. In Scots law, runrig or runridge lands were those which lay

in alternate ridges or intermixed patches belonging each to a different proprietor. According to Bell, this species of ownership arose from the practice of the common defence and watching, and the common ploughing and labouring essential to the occupation of lands in burghs or the neighbourhood of towns. The system is comparable in some respects to the common-field system of agriculture (see **LAND**). In 1695 an Act was passed to authorise the allotment into consolidated portions of the various severally-owned dispersed ridges, and by the gradual applications of this process practically all runrig lands have been so consolidated.

Runswick Bay, see **HINDERWELL**.

Runyon, Alfred Damon (1884-1946), Amer. author and humorist, b. Manhattan, Kansas. At the age of 14 he enlisted in the Army and served in the Sp.-Amer. War. After that he was a war correspondent and then a columnist, but made his name in short-story writing. He gave unique, grotesque portrayals of the types of New York's underworld, using all the resources of Amer. slang to add humour and colour to his situations. His pubs. include *Guys and Dolls*, 1932, *Blue Plate Special*, 1934, and *Money from Home*, 1935. *More than Sorrowful*, 1937, was a Brit. pub. made up of selections from these.

Rupée (Sanskrit *rūpya*, silver), standard coin of India, whose value since 1927 has been maintained at 1s. 6d. Since April 1957 Rs 1 = 100 naye paise. Earlier Rs 1 = 16 annas and 1 anna = 12 pies. Rs 100,000 = 1 lakh (lac) and 100 lakhs make a crore. The standard coins of Ceylon and Pakistan are also called Rs and valued at 1s. 6d. See **METROLOGY**.

Rupel, riv. of Belgium, formed by the confluence of the Dyle and the Nethe near Rumst, 19 m. S. of Antwerp. After a short course of about 8 m. it falls into the Scheldt, opposite Rupelmonde. The R. gives access from the Scheldt to the maritime canal of Brussels. On its banks are situated Niel, Boom, and Terhagen, all having important brick-kilns.

Rupert, St (d. c. 720), Ger. monk of Fr. extraction. As Bishop of Worms, he evangelised S. Germany, and founded the great abbey of St Peter at Salzburg, where he was the first archbishop-abbot. Venerated as the apostle of Austria and Bavaria, his feast day is 27 Mar.

Rupert of Bavaria, Prince (1619-82), third son of Frederick V, elector palatine and titular King of Bohemia, by Elizabeth of England, daughter of James I, b. Prague. He served Charles I at Edgehill and Chalgrove Field, and proved an ingenious but erratic cavalry leader. After taking Bristol, he obliged the enemy to raise the sieges at Newark and York, but his impetuosity at Marston Moor and Naseby was disastrous. Shutting himself up in Bristol, after a short siege he surrendered, and was dismissed the king's service. After the death of Charles I he became commander of that part of the fleet which adhered to Charles II, and, narrowly escaping Adm. Blake, sailed to France and, selling his ships, joined

Charles II at Versailles. Later he served in the Navy against the Dutch. His naval tactics, though less well known, were superior to his military. He devoted his time mostly to scientific studies till the Restoration, and many useful inventions resulted, among them the compound called 'Prince's metal'; he also introduced mezzo-tints into England. He was an active member of the Board of Trade, and he was one of the chief founders of the Hudson's Bay Company. See lives by J. Cleugh, 1934; C. Wilkinson, 1934; and M. Irwin, 1939.

Rupert's Land, tract of land originally granted by royal charter to 'the Governor and Company of Adventurers of England Trading into Hudson's Bay.' See HUDSON'S BAY COMPANY.

Ruphea (anot Alpheus), chief riv. of Peloponnesus, rising in the SE. of Arcadia and flowing through Elis westward past Olympia to the Ionian Sea. In its passage through the cavernous limestone of its early course it often disappears underground. The Greeks considered that at its mouth it again disappeared under the sea to reappear near Syracuse of Sicily in the fountain of Arethusa. Hence arose the myth of the riv.-god Alpheus pursuing the nymph Arethusa beneath the water.

Rupia, form of skin eruption characterised by the formation of blebs containing a serous fluid which gradually becomes purulent; the blebs dry up to form dark-brown conical scabs. The crusts are easily detached, and there is a tendency for blebs to reform, so that the scab ultimately takes on a stratified appearance. The disease is a manifestation of tertiary syphilis and occurs especially in debilitated patients. Treatment consists of the administration of potassium iodide and generalised anti-syphilitic measures, such as injection of arsenicals, bismuth, and penicillin.

Ruppin, Neu, see NEURUPPIN.

Rupture, see HERNIA.

Rupununi, dist. of Brit. Guiana (q.v.), lying S. of lat. 5° N. Area 37,380 sq. m. or 45 per cent of the total area of Brit. Guiana. The dist. is named from the R. riv., which flows through the populated savannahs, and is the connecting link to the coast. Except for the savannahs bordering the R. (where gold is found), and the Takutu and Mahu Rs., the whole dist. is covered with dense forest. The savannahs cover about 6200 sq. m. Generally speaking, they consist of low, gravelly hills and intervening flats of white clay or sand, with occasional *pegass* swamp. The so-called lake in the N. savannah, known as Amuku, is said to be the site of the legendary El Dorado which fired the imagination of Raleigh and the conquistadores (see EL DORADO). The prin. mt ranges are the Pakaraima, the Kanuku, and the Akarai. The main rivs. are the Essequibo, Berbice, and Corentyne (see BRITISH GUIANA). The Rupununi R. is a trib. of the Essequibo, flows through the populated area of the dist. and is not impeded by falls and rapids. Lethem

vil. is the gov. station and airfield in the savannahs. R. has a small pop. of Amerindians, some European and other ranchers and settlers, and a few migrant miners and workers of forest products. An Anglican mission was estab. in 1837. Traders settled there late in the 19th cent. A plan to settle Jews in the dist. as an alternative to the limited absorptive capacity of Palestine was examined by the Colonial Office in the early 1930s, but proved unacceptable. Pop. 4703.

Rural Dean, eccles. officer whose duty it is to assist the bishop by supervising part of the diocese. The office was revived in the Church of England and its duties considerably extended during the 19th cent. See DEAN.

Rural District, see LOCAL GOVERNMENT.

Rural Institutes, see WOMEN'S INSTITUTES.

Ruremonde, see ROERMOND.

Rurik (Russian Rurik) (d. 879), semi-legendary founder of the Russian ruling house of Rurikidae (q.v.). He was leader of a Varangian (Scandinavian) band of warriors, and from 862 sat as a prince in Novgorod (q.v.). Some scholars identify him as the Viking Hrörkr of Denmark, who up to 860 raided W. Europe. The year 862 is traditionally considered the beginning of Russian statehood. R.'s successor Oleg founded the great Kievan state (see KIEVAN RUSSIA).

Rurikidae, ruling house in Russia, founded by Rurik (q.v.), to which belonged the princes and grand princes of Kiev (see KIEVAN RUSSIA), the grand princes of Vladimir (q.v.), and the grand princes and tsars of Muscovy (q.v.) until Fédor I.

Rurki, or Roorkee, tn of Uttar Pradesh State, India, 60 m. NE. of Meerut. The famous Thomason Civil Engineering College, founded in 1847, is situated here.

Rusadir, see MELILEA.

Ruscino, see PERPIGNAN.

Ruscus, family Liliaceae, genus of evergreen shrubs with flattened, leaf-like, evergreen branches and dioecious flowers, followed by berry-like fruits. *R. aculeatus* (Butcher's Broom) is the only Brit. species.

Ruse (formerly Rustohuk, or Rushohuk), tn of NE. Bulgaria, cap. of R. prov., on the r. b. of the Danube (opposite Giurgiu, q.v.), 150 m. NE. of Sofia (q.v.). It dates from Rom. times, and was destroyed by the barbarians in the 7th cent. It was rebuilt on a site some 15 m. S., but in the 17th cent., under the Turks, again developed on its original site. It was attacked sev. times by the Russians in the 19th cent. There are anct churches and mosques, and there is a ruined fortress. Metal goods, textiles, foodstuffs, furniture, leather, and chemicals are manuf., and there are schools of technology. Pop. 54,000.

Rush, Benjamin (1745-1813), Amer. physician, b. at Byberry, Pennsylvania. He graduated at Edinburgh (1768), and set up a practice in Philadelphia (1769). In 1774 he and Pemberton started the first anti-slavery society in America. R. held

various professorships at Philadelphia Medical College. As a member of Congress he signed the Declaration of Independence (1776). R. successfully checked the yellow-fever epidemic of 1793. He was treasurer of the U.S.A. mint from 1799. His works covered a vast range of subjects and include: *Medical Inquiries*, 1789-98; *Diseases of the Mind*, 1812. See life by N. G. Goodman, 1934. A collection of his selected writings was pub. in 1947, and his *Autobiography*, ed. by G. W. Corner, in 1948.

Rush, seaside resort, 15 m. from Dublin, Rep. of Ireland, also noted as a market-gardening centre and for bulb-growing. Pop. 1600.

Rush, see JUNCUS.

Rush Nut, see CYPERUS.

Rush Toad, see NATTERJACK.

Rushchuk, see RUSSE.

Rushcliffe of Blackfordby, Henry Bucknall Betterton, first Baron (1872-1949), politician and administrator, b. Woodvilles, Leicestershire. He was educ. at Rugby and Christ Church, Oxford, and was called to the Bar in 1896. From 1918 until 1935 he was Conservative M.P. for Rushcliffe. His knowledge of industrial and labour questions was considerable. He became a baronet in 1929 and was appointed minister of labour in 1931, a post in which he was highly successful. From 1934 until 1941 he was chairman of the assistance board. He was chairman of a committee which worked out the lt. scale of salaries for nurses and midwives. He was created a peer in 1935.

Rushden, manufacturing tn and urb. dist. in Northants, England, 12 m. N. of Bedford. Boots and shoes are manufactured. Pop. 16,400.

Rushen, par. in the SW. of the Isle of Man, England, including the vils. of Port Erin and Port St. Mary, 12 m. WSW. of Douglas. Pop. 4000.

Rushworth, John (c. 1612-90), historian, b. Northumberland. He studied at Lincoln's Inn, and was called to the Bar in 1647. R. is noted for his *Historical Collections*, 1659-1701, compiled from shorthand notes taken down at actual meetings of the Star Chamber, Exchequer Chamber, and Parliament, and covering the period down to 1648. In 1640, he became assistant clerk to the House of Commons, and was frequently employed as messenger between Charles I and Parliament. R. was secretary to Lord Fairfax (1645-8), and gave Parliament news of the army actions. This he continued to do until the end of Cromwell's Scottish campaign. He sat for Berwick in Parliament 5 times, and was agent for Massachusetts under Charles II.

Ruscada, see PHILIPPEVILLE.

Ruskin, John (1819-1900) author and critic, b. London, son of an Edinburgh merchant. His upbringing was abnormally strict. From childhood he was encouraged to read good literature and write and draw, and to appreciate the beauties of nature. Drawing he subsequently learnt under Copley Fielding and

Harding. He studied at King's College, London, and then, in 1836, went to Christ Church, Oxford. Three years later he won the Newdigate prize for Eng. verse. Ill-health in 1840 compelled him to go abroad, but he returned to Oxford in 1842, and took his degree. He had already contributed articles to sev. magazines, but he first became widely known in 1843, when he pub. the first vol. of *Modern Painters*, in which he came forward with a defence and appreciation of the later style of Turner. The second vol., pub. in 1846, attracted even wider attention. The third and fourth vols. appeared in 1856, and the fifth and last in 1860. He married in 1848 Euphemia Chalmers Gray, but the marriage was, owing to the characters of both parties and the interference of R.'s mother, extremely unhappy. In 1855 his wife obtained a decree of nullity in an undefended suit and married Millais (q.v.).



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JOHN RUSKIN

R.'s pubs. had already made him famous; he was on intimate terms with many great literary and artistic personages, including Millais, Watts, Carlyle, Froude, and the Brownings. In the autumn of 1863 R. delivered a course of lectures at Edinburgh on architecture and painting. He had in 1849 issued *The Seven Lamps of Architecture*, in which he laid down the laws that should govern that art. The 7

leading principles, he declared, were sacrifice, truth, power, beauty, life, memory, and obedience. In 1851-3 was pub. *The Stones of Venice*, illustrated by himself. In this work R. laid down the principle which coloured all his artistic criticism, maintaining that good architecture and art, though it need not be eccles., must be religious in spirit. Other works of this period were *Notes on the Construction of Sheepfolds*, 1851, *The Political Economy of Art*, 1857, subsequently renamed *A Joy for Ever*, *The Elements of Drawing*, 1857, *The Two Paths*, 1859, and *The Elements of Perspective*, 1859. He was by this time accepted as the greatest authority on art in England, and his pronouncements undoubtedly hastened the recognition of the artistic value of the works of Turner and the Pre-Raphaelites.

R. at the beginning of the sixties was as much interested in economics and social reform as in art, and devoted much time to these, though his conclusions were rarely orthodox. He attacked materialism and 'the dismal science' of political economy. He thus reinforced the philosophy of Carlyle. His next works were *Unto this Last*, 1862, *Seam and Lilies*, 1865, *The Ethics of the Dust*, 1866, and *The Crown of Wild Olive: Three Lectures on Work, Traffic and War*, 1866. In these pub. R. showed himself an ardent critic of modern civilisation, and the prophet of a spirit of regeneration. From 1855 he lectured all over the country on art and economics and architecture. On the death of his father in 1864, R. inherited a fairly substantial fortune, out of which he gave generously. He had many pensioners, he assisted struggling artists, and gave money for Miss Octavia Hill's housing campaign, as well as gifts of valuable pictures to institutions. In 1871 he moved to Brantwood, Coniston Lake, his last home. He pub. monthly for workmen *Fors Clavigera*, in which much of his best work appears, and in 1871 founded the Guild of St George. He was first Slade prof. of art at Oxford from 1870 to 1879, and he again occupied the chair from 1883 to 1889. From 1885 he pub. from time to time *Præterita*, an autobiography which however, was never carried beyond 1890. It throws valuable light on R.'s religious development. His health gave way in 1878, and after this year he had occasional attacks of brain fever. An ed. of his works was ed. by E. T. Cook and A. Wedderburn, 1903-12. See lives by A. C. Benson, 1911; J. Morley, 1917; R. H. Wilenski, 1933; D. Leon, 1949; P. Quennell, 1949; also *The Order of Release* (letters ed. by Sir W. James), 1948.

Ruskin College, Oxford, founded by two Americans, Walter Vrooman and Charles Beard, in 1899. Originally known as Ruskin Hall, the college provides higher liberal education for working men and women, particularly those associated with trade unions and other working-class organisations. Its main field of studies is the social sciences, especially economics and industrial relations, politics, and

modern history. The college is recognised and grant aided by the ministry of education, and its students are financed by trade unions, local education authorities, etc. Oxford Univ. extends to Ruskin students the privileges of attending univ. lectures, participating in undergraduate activities, and sitting for univ. diploma examinations. R. C. is governed by a council representative of the working-class organisations which support its work.

Russelia, small genus of stove evergreens, family Scrophulariaceae, of which *R. juncea*, the Coral Plant, and *R. x Lemoinei* are grown for their pendant scarlet, tubular flowers.

Russell Family, famous Eng. family. The barony dates back to 1539. Branches of the family hold the titles of Earl Russell and Lord Amphil. In hist. the family is notable for its Protestantism and Radicalism, and besides those members to whom special articles have been devoted, mention should be made of the following: Francis, 4th Earl of Bedford (1593-1641), took part in draining the Fens, and built the square of Covent Garden. Sir John (fl. 1440-70), Speaker of the House of Commons and grandfather of 1st Earl of Bedford. John, 1st Earl of Bedford (c. 1486-1555), a prominent Eng. courtier. William 1st Duke of Bedford (1613-1700), sat for Tavistock in the Long Parliament. See Gladys Scott Thomson, *Life in a Noble Household, 1641-1700*, 1937, *The Russells in Bloomsbury, 1669-1771*, 1940, and *Family Background*, 1947.

Russell, Arthur and Odo, see AMPHILL, first and second BARONS.

Russell, Bertrand Arthur William Russell, third Earl (1872-), philosopher and mathematician; b. Treleck, second son of John, Viscount Amberley, and grandson of the 1st earl. Educ. privately and at Trinity College, Cambridge, where he obtained a first class in mathematics and moral sciences. R. served for a year (1894-5) as attaché at the Brit. embassy in Paris. In 1895 he was elected fellow of Trinity College, and in 1903 he pub. *Principles of Mathematics*. Having been appointed lecturer in 1910, R. collaborated with A. N. Whitehead in the pub. of *Principia Mathematica* 1910-13. In 1914 his outspoken pacifism caused him to be deprived of his lectureship and refused a passport to the U.S.A., where he had been offered a similar post at Harvard. Four years later R. was condemned to 6 months' imprisonment for a pacifist article in *Tribunal*, and while serving his sentence he wrote his *Introduction to Mathematical Philosophy*, 1919. R. succeeded his brother as earl in 1931, but has never used the title. Among his other pub. are *The Philosophy of Leibniz*, 1900, *A B C of Atoms*, 1923, *A B C of Relativity*, 1925, *An Outline of Philosophy*, 1927, *The Analysis of Matter*, 1927, *Sceptical Essays*, 1928, *The Scientific Outlook*, 1931, *Power: a New Social Analysis*, 1938, *An Enquiry into the Meaning of Truth*, 1940, *A History of Western Philosophy*, 1946, *Human Knowledge, its Scope and Limits*, 1948, *Authority and the Individual*, 1949.

New Hopes for a Changing World, 1951, *The Impact of Science upon Society*, 1952. R. is an original and independent thinker with a fine literary style. He calls his own philosophy 'Logical Atomism,' in which he combines philosophy and mathematics. He is a psychological reformer, stressing the value of creative impulses. He was awarded the O.M. in 1944, and the Nobel Prize for Literature in 1950. See POSITIVISM, LOGICAL.

Russell, Charles Edward (1860-1941), Amer. journalist and author, b. Davenport, Iowa. Managing editor of *New York American* (1897-9); publisher of *Chicago American* (1900-2). Socialist candidate for governorship of New York (1910, 1912); and for U.S. senator (1914); but declined Socialist nomination for U.S. presidency (1916). Wrote: *Such Stuff as Dreams*, 1902, *Thomas Chatterton, the Marvellous Boy*, 1908, *Songs of Democracy*, 1909, *Why I am a Socialist*, 1910, *The American Orchestra and Theodore Thomas*, 1927 (awarded Pulitzer Prize for biography), *Haym Salomon and the Revolution*, 1930, *Bare Hands and Stone Walls*, 1933, an autobiography.

Russell, C. T., see JEROME'S WITNESSES.

Russell, Edward, see ORFORD, EARL OF.

Russell, George William ('Æ.') (1867-1935), poet, b. Lurgan, co. Armagh. Educ. at Rathmines School, he passed to the school of art and practised painting. R. became leader of a circle that pub. the *Irish Theosophist*, in which his first poems, afterwards pub. as *Homeward: Songs by the Way*, 1894, and *The Earth Breath*, 1897, appeared. He attached to one poem the signature 'Æon,' which was printed 'Æ.' and he was afterwards always known by this pseudonym. He and W. B. Yeats were known as the leaders of the Irish literary revival, and though Yeats overshadowed him 'Æ.' wrote a number of poems of remarkable lyrical beauty, much influenced by his study of E. mysticism. In 1897 Yeats recommended him to Horace Plunkett (q.v.), and 'Æ.' who was working as an accountant in Pim's drapery, gave up that post and went bicycling through Ireland, interviewing the rural people. He devoted a great deal of his life to the promotion of agric. co-operation. The *Irish Statesman*, a venture of his own, lasted from 1923 to 1930. Some of his pubs. are *The Nut of Knowledge*, 1903, *Deirdre* (play), 1907, *Ideals of the New Rural Society*, 1911, *Salutation*, 1916, *Standish O'Grady*, 1920, *Enchantment and other Poems*, 1930. R. was a pioneer of the Dublin Abbey Repertory Theatre. See G. Moore, *Hail and Farewell*, 1914; Darrell Figgis, *Æ.*, *a Study of a Man and a Nation*, 1916; W. K. Magee, *A Memoir of Æ.*, 1937.

Russell, Henry Norris (b. 1877-), Amer. astronomer, b. Oyster Bay, New York. He was educ. at Princeton, New Jersey, and later studied under Ball at Cambridge. R. succeeded Young as director of Princeton Observatory in 1908. In 1913, independently of Hertzsprung, he showed that the stars fall into 2 well-defined classes, giants and dwarfs, and

outlined a new theory of stellar evolution. He devoted a considerable amount of time to the problem of the evolution of the solar system, the physical conditions of the planets, and the composition of planetary atmospheres, and in 1935 disproved Jeans's tidal theory of the origin of the solar system. Amongst his chief works may be noticed the following: *Probable Order of Stellar Evolution*, 1914, *The Solar System and its Origin*, 1933, *The Atmospheres of the Planets*, 1935, *Present State of the Theory of Stellar Evolution*, 1942, and (in collaboration with Dugan and Stewart) *A Revision of Young's Manual of Astronomy*, 3 vols., 1926-7, 1945.

Russell, Israel Cook (1852-1906), Amer. geologist, assistant professor at the Columbia Univ. School of Mines (1876-78), geologist on the U.S. Survey (1880), exploring the S. portion of the Appalachians, the Rockies, and regions in Alaska. He was elected to the chair of geology in Michigan Univ. (1892-1906). R.'s pubs. include *Lake Lahontan*, 1885, *Lakes of N. America*, 1895, *Present and Extinct Lakes of Nevada*, 1895, *Glaciers of N. America*, 1897, *Rivers of N. America*, 1898, *N. America*, 1900, 'Geology of the Cascade Mts' (*Annual Report U.S.A. Geological Survey*, 1900).

Russell, John (1745-1806), painter, b. Guildford. He became A.R.A. in 1772, and R.A. in 1788. In 1789 R. was appointed king's painter. He worked mainly in pastel, and a number of his portraits hang in the National Portrait Gallery.

Russell, Lord John, first Earl Russell (1792-1878), statesman, b. London, the third son of John R., 6th Duke of Bedford, and educ. privately, at Westminster, and at Edinburgh Univ. He entered Parliament as a Whig, and was an ardent supporter of reform. He first pressed for parl. reform in 1819, and supported the repeal of the Test Acts and Rom. Catholic emancipation. He became paymaster-general of the forces in 1831, and led the House of Commons during Melbourne's short-lived administration 3 years later. When Melbourne again came into power in 1835 he was home secretary, but in 1839 went to the Colonial Office. He led the opposition against Peel, and when Peel retired in 1846 he formed an administration. At the instance of Queen Victoria he insisted upon the resignation of the Foreign Secretary, Palmerston, who had without authorisation recognised Napoleon III as emperor of the French after the *coup d'état* (1851). In 1852 he was defeated and resigned, but accepted a seat in Aberdeen's Cabinet. He was for a short time colonial secretary under Palmerston in 1855, but in 1859 went to the Foreign Office under the same leader. He was created Earl R. in 1861, and 4 years later, on the death of Palmerston, again became Prime Minister, with Gladstone as leader of the House of Commons, but held office for only a few months, resigning when his reform bill failed. Literature

as well as politics interested R., and his works are a *Life of Lord William Russell*, 1819, an *Essay on the English Constitutions* 1821, and *Causes of the French Revolution*, 1832. R. came of a family all the members of which were versed in political matters and familiar with official and ministerial work. He was a good, but not inspired, speaker, but at times he rose to a high level of eloquence. R. in fact anticipated some of the policy usually associated with Palmerston, which made Britain appear frequently in the role of the champion of continental Liberalism; he had, however, less common sense than Palmerston, and his policy frequently rested on the most shaky foundations. His greatest characteristic was self-confidence, which nothing, however untoward, could undermine. See lives by Sir S. Walpole, 1899, and A. W. Tilby, 1930.

Russell, John Scott (1808-82), civil engineer and naval architect, b. Parkside, near Glasgow. He studied at Edinburgh, St Andrew's, and Glasgow Univs., and in 1832 became prof. of natural philosophy at Edinburgh. He began his famous series of observations on waves (1834), experimenting to ascertain the form of ships that will offer the least resistance and to test the possibility of utilising steam navigation on the Edinburgh and Glasgow Canal. He built the *Great Eastern* and other ships. R. was one of the organisers of the 1851 exhibition.

Russell, Mary Annette, Countess, see ARNIM, MARY ANNETTE, COUNTESS VON.

Russell, Sir Walter Westley (1867-1949), painter, studied at the Westminster School of Art, was elected A.R.A. in 1920 and R.A. in 1926. He became keeper of the Royal Academy in 1927 and 1938 trustee of the Tate Gallery, where his paintings are well represented—his 'Mr Minney' being a striking work.

Russell, Lord William (1639-83), politician, third son of Wm R., 5th Earl and 1st Duke of Bedford. R. studied at Cambridge. After the Restoration he entered Parliament and was soon regarded as one of the prin. opponents of court policy. Becoming entangled with the Rye House conspirators, he was, on very little evidence, found guilty of high treason and beheaded in Lincoln's Inn Fields. The Whigs came to regard him as a martyr for religious and civil liberty; his real character is not well known, but it seems probable that his actions were prompted, to a large extent, by personal ambition. See life by Lord John Russell, 1853.

Russell, William Clark (1844-1911), Brit. novelist, b. New York. He entered the merchant service and made sev. voyages to India and Australia which supplied material for his books on the sea. His first novel, *John Holdsworth, Chief Mate*, 1875, was followed by *The Wreck of the 'Grosvenor'*, 1877, which made his reputation, and he pub. over 50 other sea stories, of which the best-known are *The Frozen Pirate*, 1877, *A Sailor's Sweet-*

heart, 1880, *An Ocean Tragedy*, 1881, *The Death Ship*, 1888, *List Ye Landmen*, 1894, and *Overdue*, 1903. He also wrote lives of Dampier, 1889, Nelson, 1890, and Collingwood, 1891.

Russell, Sir William Howard (1820-1907), journalist, b. Lily Vale, co. Dublin. Educ. at Trinity College, he was called to the Bar in 1850. Having joined the staff of *The Times*, he was sent as war correspondent to the Crimea, his letters from which caused a profound sensation, and led to an improved condition of things in regard to the army. In describing the battle of Balaklava he used the phrase 'thin red line' which has become a classic expression. He was correspondent in India during the Mutiny, in America during the Civil war, and in the Franco-Prussian War of 1870. Knighted in 1895, he also received various foreign decorations. See life by J. B. Atkins, 1911.

Russell of Killowen, Sir Charles Russell, Lord (1832-1900), lawyer and lord chief justice of England, b. Newry of Rom. Catholic parents. He was educ. at private schools and at St Vincent's College, Castleknock; he was articled in 1852 and admitted a solicitor in 1854, and practised in the co. courts of Down and Antrim. In 1856 he removed to London and entered at Lincoln's Inn, was called to the Bar in 1859, and was Q.C. in 1872. He sat in Parliament as member for Dundalk (1880-5), and for S. Hackney in 1885-6 and in 1892, and was attorney-general in 1886 and 1892. A strong Home Ruler, he was leading counsel for Parnell before the commission, was one of the Brit. representatives in the Bering Sea arbitration, made lord of appeal and given a life peerage in 1894, and made lord chief justice the same year. He introduced the Secret Commissions Bill in 1900. R. was one of the greatest of 19th-cent. Brit. judges. Few have been able to equal the brilliant lucidity of his summings-up, and, as counsel, his skill in cross-examination was outstanding. In a private capacity R. played a large part in the Eng. Catholic revival.

Russia (or, since 1922, Union of Soviet Socialist Republics, abbreviations U.S.S.R., Soviet Union), quasi-federal state in Europe and Asia, comprising 15 Soviet Socialist Reps. Area (1956) 8,750,000 sq. m., officially estimated pop. (1956) 200,201,000.

PHYSICAL GEOGRAPHY. *Boundaries.* R. is bounded on the W. by Norway, Finland, the Baltic, Poland, Czechoslovakia, Hungary, and Rumania; on the S. by the Black Sea, Turkey, Persia, Afghanistan, China, and Mongolia; on the E. by the Pacific Ocean; and on the N. by the Arctic Ocean. The Bering Straits (35 m. in width) separate R. from Alaska (U.S.A.) in the N.E. In the S. R. reaches a lat. of 36° N., while its northernmost point is well within the Arctic Circle, reaching as far as 80° N. It extends from long. 20° E. to 170° W.

Orography. The relief of R. is very varied. From the W. frontier to the R. Yenisey lies a vast plain, transected by

the Ural Mts (greatest height, 6155 ft). To the W. of the Urals it is called the Russian or E. European plain, and to the E. of the Urals the W. Siberian lowland. The Russian plain takes up about a quarter of the whole area of the country; sev. parts rise to between 650 ft and 1100 ft—the Central Russian and Volga uplands, the Donets and T'iman ridges, etc.; other parts are below 650 ft (and occasionally even below sea-level)—the Black Sea, Caspian Sea, and other lowlands. To the S. of the Russian plain rise the Caucasian (highest peak El'brus, 18,470 ft), Crimean, and Carpathian Mts. To the S. of the W. Siberian lowland lie the Kazakh hills, farther S. the Turan lowland, and in the extreme S., on the frontiers of China, Afghanistan, and Persia, rise the mt chains of Tien-Shan (Victory Peak, 24,187 ft), Pamir-Alay (Stalin Peak, 24,598 ft, the highest point in R.), and Kopet-Dag.

Almost a half of R., to the E. of the Yenisey, is mountainous country, with a few lowlands and depressions. Between the R.s Yenisey and Lena lies the Central Siberian plateau, with average heights of 1500–2000 ft; it is surrounded by the Altay (highest peak 13,644 ft) and Sayan Mts, and those of the Lake Balkal region in the S., and a complex system of mts in the E., the easternmost of which are long ridges stretching along the Pacific shore, including in the Kamchatka peninsula sev. volcanoes.

Inland Waters. The chief rvs. of European R. have their sources comparatively near one another in the Central Russian upland. Some of them flow S.—the Volga into the Caspian Sea, the Don into the Sea of Azov, and the Dnieper into the Black Sea; others flow to the N.—the N. Dvina into the White Sea—and to the NW.—the W. Dvina into the Baltic. Other important rvs. of European R. are the Pechora in the NE., flowing into the Barents Sea, the Neva in the NW., connecting Lake Ladoga and the Gulf of Finland, the Niemen in the W., flowing into the Baltic Sea, the Dniester and the delta part of the Danube in the S., flowing into the Black Sea, the Kuban flowing into the Sea of Azov, and the R. Ural (traditionally considered the frontier between Europe and Asia) in the SE., flowing into the Caspian Sea.

The chief rvs. in Asiatic R. have their sources in the mts of the S., and flow N. into the Arctic Ocean (the Ob', Yenisey, and Lena), E. (the Amur, flowing into the Sea of Okhotsk), or NW., flowing into the inland Aral Sea (the Amu-dar'ya and the Syr-dar'ya). Other important rvs. flowing N. are the Khatanga and the Olenëk between the Yenisey and the Lena, and the Yana, Indigirka, and Kolyma to the E. of the Lena. In the SW. there are the Ili, flowing into Lake Balkhash, the Murgab, whose water is entirely used up for irrigation, and the Kura in Transcaucasia, flowing into the Caspian Sea.

The largest lakes in R. are the Caspian and the Aral Seas. The other big lakes are Ladoga and Onega in the NW. of

European R., and Baikal (the deepest lake in the world, 4500 ft), Balkhash, and the Issyk-Kul' in the S. of Asiatic R.

Artificial Waterways connect most of the main rvs. of European R. with one another. Among the most important are the Volga-Neva system and the Volga-Don and Moskva-Volga canals. Another important artificial waterway is the White Sea-Baltic system.

Artificial Reservoirs are in most cases connected with big hydro-electric power stations—the Rybinsk, Kuybyshev, and Stalingrad reservoirs on the Volga, Tsyml'yansk on the Don, and Kakhovka on the Dnieper.

Climate. R. lies within 3 climatic belts: the Arctic, the temperate, and the sub-tropical. The Arctic belt stretches along the shores of the Arctic Ocean and has long, cold winters and short, cool summers with little precipitation. The temperate climatic belt is divided into 3 regions: the Atlantic, from the W. frontier to the R. Yenisey, with a moderately continental climate; the E. Siberian, between the Yenisey and the mt ranges along the Pacific coast, with an extremely continental climate; and the Pacific, with a monsoon-type climate. The sub-tropical climate is characteristic of the S. shore of the Crimea, parts of Transcaucasia, and Central Asia.

Mineral and Power Resources. R. is rich in mineral resources. The country is not yet thoroughly studied, and further prospecting often leads to important new discoveries.

The first place among the *fuel* resources is taken by coal. The main deposits are in Asiatic R.—along the S. edge of the W. Siberian lowland (Turgay depression, Karaganda, Ekibastuz, Kuznet'sk Basin), in the Central Siberian plateau, the Lena valley, the Amur area, the Fergana valley and the upper Syr-dar'ya, etc. In European R. the main deposits of coal are in the Donets Basin in the S., the Pechora basin in the NE., and the lignite deposits S. and W. of Moscow. The chief oil deposits are, on the contrary, found in European R., between the middle Volga and the Ural mts; those of the Caucasus are next (Baku, Groznyy, Maykop). Less important are those of Sakhalin Is. in the Far E., NE. and SE. of the Caspian Sea, the Fergana valley, and the Carpathian foothills (Galicia). R.'s resources of *water power* are enormous, particularly in Siberia and Central Asia.

The chief deposits of *iron ore* are those of the Urals, the Dnieper bend (Krivoy Rog), and the S. of the Central Russian upland (Kursk) in European R., and of the Turgay depression and the S. edge of the Central Siberian plateau in Asiatic R. The main deposits of *non-ferrous metals* are concentrated in the Urals, the Altay mts, the Kazakh hills, and in the Caucasus, though rich new deposits are constantly being found in the Central Siberian plateau and E. Siberia. *Precious metals* (gold, platinum) are found chiefly in the Urals and the Altay Mts, as well as in the Amur and Kolyma regions in the Far E. Little is

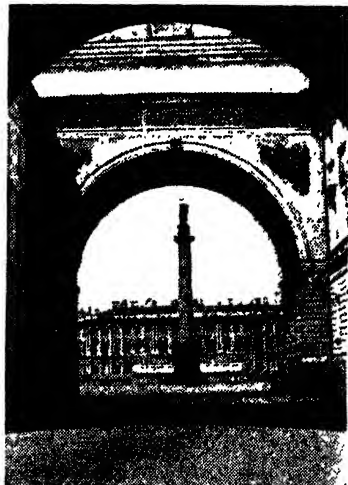
known about the deposits of *uranium*, the chief raw material for atomic power, apart from the fact that it is extracted in Noril'sk in the NW. of the Central Siberian plateau. In the E. of this same plateau large diamond deposits have recently been discovered, said to rival those of S. Africa.

Soil, Flora, and Fauna. Running across the whole of R., from the W. to the E., there are the following 4 belts or zones, each of which has its own characteristic combination of soils, vegetation, and animals. The *tundra* zone, which roughly coincides with the Arctic climatic belt, has poor, marshy soil, scarce vegetation in the form of grasses, scrubs, mosses, and lichens, and there are few animals. Typical mammals are reindeer, Arctic foxes, and lemmings. Among the birds permanently living in the *tundra* are ptarmigan and Arctic owls; in the summer many migrant birds live in this belt—geese, ducks, snipe, etc.

To the S. of the *tundra*, in the temperate climatic belt, lies the Forest Zone, taking up about half of the total area of R. and reaching as far S. as Kiev-Kaluga-Ryazan'-Gor'kiy-Kazan'-Ufa in European R. and Tyumen'-Tomsk in W. Siberia. In E. Siberia and in the Far E. the Forest Zone extends to the slopes of the S. Mts and the Mongolian and Chinese frontier. The soils in the Forest Zone are of the grey, *podzol* type, and there are many marshes. In vegetation it is divided into 2 sub-zones—the *taiga* with coniferous forests (spruce and pine in European R., larch, fir, spruce, pine, and cedar in Siberia); and the mixed forests sub-zone with predominantly deciduous species (mostly oak in the W. and linden in the E., also elm, maple, ash, beech, birch, aspen, and alder), with an admixture of pine. The borderline between them runs from Leningrad to Yaroslavl' and Gor'kiy, E. of which the mixed forests form a very narrow belt along the S. edge of the Forest Zone as far as Yenisey. They reappear again in the monsoon area along the Amur and the Pacific coast N. of Vladivostok, where there is an admixture of subtropical species. Typical animals of the Forest Zone are the elk, brown bear, glutton, fox, marten, squirrel, and hare; in Siberia also the reindeer, lynx, and sable, and in the mixed forests in European R. the roebuck. Typical birds of the *taiga* are the capercaillie, hazel hen, nuthatch, and crossbill; of the mixed forests titmice, thrushes, goldfinches, etc. The fauna of the Far E. mixed forests is very rich; together with typical *taiga* species, deer, wild boar, tigers, leopards, and pheasants are common, and even tropical turtles are found.

S. of the Forest Zone lies the Steppe Zone, subdivided into the forested steppes, steppes proper, and semi-deserts. The forested steppes stretch in a narrow belt between the mixed forests and proper steppes, the semi-deserts similarly between steppes and deserts. Both are transitional sub-zones with mixed characteristics. The

Steppe Zone has fertile Black Earth (*chernosem*) and chestnut soils. Natural vegetation, consisting of mixed grasses in the N. and feather grass with fescue in the S., has almost disappeared in European R., where the steppes have been almost completely cultivated, but it is still preserved in W. Siberia; in the semi-desert wormwood is typical. The most typical animals of the Steppe Zone are the rodents—the hamster, suslik, field mouse, and marmot, as well as the wolf and fox; among the birds are larks, cranes, partridges, eagles, ducks, and geese. There are many more reptiles in the steppe than in the forests—lizards, snakes (adders), etc. The insects include the migrating locust.



'Soviet Weekly'

LENINGRAD: THE DVORTSOVAYA SQUARE AND THE ALEXANDER COLUMN

The Winter Palace can be seen through the Red Army Arch.

The Desert Zone lies between the steppes in the N. and the mts in the S., and is limited to Central Asia from the lower Volga to the Altay Mts and to E. Transcaucasia. N. deserts are still in the temperate climatic belt and have cold winters, while S. deserts have a dry, subtropical climate. The soils of the desert are sandy, stony, or clayey according to the subsoil. The vegetation is sparse and consists of wormwood, various halophytes, and saxaul shrubs; the desert animals include the wild ass, gazelle, jerboa, and a variety of reptiles, including the giant monitor lizard. In the natural oases there are thickets of poplar, willow, bamboo, and wild sugar-cane, and the fauna is also rich, including tigers, wild

cats, jackals, deer, pheasants, ibis, and storks. There are also small areas of subtropical vegetation in R., namely the Colchis (q.v.) and Talysh (q.v.) in Transcaucasia and on the S. coast of the Crimea. The mountainous areas have vertical vegetation zones which roughly correspond to the latitudinal zones of the plains.

POPULATION. The total pop. of R., estimated in April 1956 at 200,201,000, is made up of 86,969,000 townspeople and 113,232,000 rural pop. Thus the percentage is 43.4 to 56.6, as compared to 17.9 and 82.1 in 1926, the latter being practically the same as in 1913. The social composition, as given by Soviet sources, was at the beginning of 1956 as follows: workers and employees, c. 117,000,000 (including 28,000,000 of what are officially called intelligentsia); *kolkhoz* peasants and co-operated artisans, c. 82,000,000; individual peasants and unco-operated artisans, c. 1,000,000.

The average density of the pop. in R. is 3.5 persons per sq. m., considerably lower than the world average (6.1). The distribution of the pop. is very uneven; vast spaces in the N. of European R., in Siberia, and Central Asia have less than 1 person per sq. m., whereas the areas with the densest pop.—around Moscow, the Donets Basin, and the Fergana valley—have 100 or even 150 people per sq. m. Two-thirds of the whole ter. of R. is inhabited by 6 per cent of the pop., while 6 per cent of the ter. has one-half of the whole pop. The great mass of the pop. is concentrated within the area bounded by the W. frontier and a line from Leningrad to the Upper Volga, along the Volga to Stalingrad, and thence along the Don to the Sea of Azov.

Chief Towns. Cities in R. with an estimated pop. at the beginning of 1956 of over 200,000 were: Moscow, 4,839,000; Leningrad, 2,814,000 (with suburbs, 3,178,000); Kiev, 991,000; Kharkov, 877,000; Gork'iy, 876,000; Tashkent, 778,000; Kuybyshev, 760,000; Novosibirsk, 731,000; Sverdlovsk, 707,000; Tiflis, 635,000; Stalino, 625,000; Chelyabinsk, 612,000; Odesa, 607,000; Baku, 598,000 (with suburbs, 901,000); Dnepropetrovsk, 576,000; Kazan', 565,000; Riga, 565,000; Rostov, 552,000; Perm', 538,000; Stalingrad, 525,000; Saratov, 518,000; Omsk, 505,000; Ufa (with Chernikovsk), 471,000; Minsk, 412,000; Voronezh, 400,000; L'vov, 387,000; Yerevan, 385,000; Zaporozh'ye, 381,000; Yaroslavl', 374,000; Karaganda, 350,000; Stalinsk, 347,000; Alma-Ata, 330,000; Krasnoyarsk, 328,000; Krivoy Rog, 322,000; Tula, 320,000; Ivanovo, 319,000; Irkutsk, 314,000; Makeyevka, 311,000; Nizhniy Tagil, 297,000; Magnitogorsk, 284,000; Khabarovsk, 280,000; Astrakhan', 278,000; Zhdanov, 273,000; Krasnodar, 271,000; Vladivostok, 265,000; Prokop'yevsk, 260,000; Tallinn, 257,000; Barnaul, 255,000; Izhevsk, 252,000; Voroshilovgrad, 251,000; Kalinin, 240,000; Kemerovo, 240,000; Gorlovka, 240,000; Archangel, ---; Penza, 231,000;

Groznyy, 226,000; Orenburg, 226,000; Tomsk, 224,000; Kirov, 211,000; Nikolayev, 206,000; and Vilnius, 200,000. The pop. of Vorkuta is also probably over 200,000.

Ethnic Composition. Ethnically the pop. of R. is very diverse, consisting of sev. dozens of peoples and ethnical groups of various sizes. They all belong to 2 of the main races of mankind: the white, or European, and the yellow, or Mongol. The most convenient classification is that based on language.

The majority of the pop. belongs to the Indo-European family. The main group of this family in R. are the Slavs, whose R. or Russian branch constitutes the core of the nation. The Great Russians—now more often called simply Russians—who make up over a half of the whole pop., inhabit the centre and N. of European R. and form the majority of the pop. in the SE., the Volga-Urals region, and Siberia. They also form a considerable part of the pop. in other parts of the country. The Ukrainians (formerly often called Little Russians), making up about 20 per cent of the whole pop., inhabit the SW. of European R. and, together with the Great Russians, have colonised the E. part of the country. The Belorussians (or White Russians) are the main people of the W. part of European R. There are also some other Slavs—Poles, Czechs, and Bulgarians—scattered among the Russians. Other Indo-Europeans are the Lithuanians and Latvians, belonging to the Baltic group; Moldavians, belonging to the Romance group, who live in the extreme SW. near the Rumanian frontier; Germans, who used to live on the Lower Volga but were deported to W. Siberia in 1942; Greeks, who live scattered in S. Russia; Armenians, mainly in Transcaucasia; Tadzhiks, who belong to the Iranian group and live in Central Asia; and the Ossetians, also of the Iranian group, who live in the Caucasian mts.

The Caucasian languages (sometimes called Japhetic) are spoken by the Georgians and Abkhazians in W. Transcaucasia, and the Circassians and the various peoples of Daghestan in the N. Caucasus. Two other Caucasian-speaking peoples, the Chechens and Ingushes, were deported from N. Caucasus to Central Asia in 1943.

The third big family are the Finnish peoples—Estonians, Karelians, Finns, and some Lapps in the NW., Komis and Udmurts in the NE. of European R., and Mari and Mordva on the middle Volga. Related to the Finnish family are the Nenets (formerly called Samoyeds), who live along the Arctic Sea shore in European R. and W. Siberia; and the Khanty and Mansi, whose language is related to Hungarian and who live along the middle course of the R. Ob' in W. Siberia.

The fourth and last of the big linguistic groups (numerically the second largest in R.) are the Turkic-speaking peoples. They make up the majority of the pop. in Central Asia (Uzbeks, Kazakhs, Kirghis, Turkmens, and Kara-kalpakhs) and E.

Transcaucasia (Azerbaijanis), and are numerous in the Volga-Urals region (Tatars, the most numerous Turkic-speaking people in R., Chuvashes, and Bashkirs) and in Siberia (Tatars, Yakuts, and the peoples of the Altay and Sayan Mts.). Three Turkic-speaking peoples, the Crimean Tatars, the Karachay, and the Balkars, were deported from the Crimea and N. Caucasus to Siberia and Central Asia.

The Mongolian-speaking peoples in R. are the Buryats (around Lake Baikal) and the Kalmyks, who used to live on the

Orthodox Church in R. is the Georgian. There are also a considerable number of so-called Old Believers or Old Ritualists among the Russians. The Protestant denominations are the Lutheran in Latvia and Estonia, the Baptist (throughout R.), and various smaller sects. The Lithuanians belong to the Rom. Catholic Church, a part of the W. Ukrainians to the Catholic Church of the E. Rite, and the Armenians to the Armenian-Georgian Church. The second biggest religious group are the Moslems, to whom belong all the Turkic-speaking peoples



THE MANUFACTURE OF SOVIET CARS

Camera Press

Inside the assembly shop of the V. M. Molotov Automobile Plant at Gor'kiy.

Lower Volga but were deported to Central Asia.

Finally, there are a number of small peoples indigenous to E. Siberia and the Far E.; those of the Tungus group (Evenki and a number of smaller tribes) and of the Paleo-Asiatic group (Chukchi, Koryaks). Another Far E. group are the Koreans, many of whom used to live near the Korean border but were deported to Central Asia in 1937.

A numerous people who do not fit into any linguistic group are the Jews (of whom there are about 3,000,000 in R. living scattered throughout the country), the majority of whom speak Russian or Yiddish.

Religions. The majority of believers in R. are Christians and belong to the Russian Orthodox Church. Another

(except the Chuvashes and Yakuts), the Tadzhiks, and the N. Caucasian peoples. The third religion is Judaism; and the fourth Buddhism among the Buryats and Kalmyks. Among the smaller Siberian tribes a form of paganism, commonly called Shamanism, is practised.

ECONOMY. Agriculture. The total cultivated area of R. was 458,000,000 ac. in 1955 (297,000,000 in 1913, 368,000,000 in 1950), of which 312,000,000 ac. was taken up by grain crops (1913, 258,000,000; 1950, 254,000,000), 30,400,000 ac. by industrial crops (1913, 12,100,000; 1950, 30,000,000), 28,200,000 ac. by potatoes and other vegetables (1913, 12,600,000; 1950, 24,800,000), and 86,700,000 ac. by forage crops (1913, 8,200,000; 1950, 49,600,000). The yields are low; e.g. the average yield of wheat in 1950-2 was

9.5 metric cwt per hectare (38 in Denmark and 27 in Britain); of European countries, only Yugoslavia and Spain have comparably low yields.

The number of domestic animals (in millions) is shown in the following table:

	1916	1928	1955	Per 1000 of Pop.	
				1928	1955
Cattle	58.4	66.8	67.1	440	310
including cows	28.8	33.2	29.2	218	135
Pigs	23.0	27.7	52.2	182	241
Sheep and goats	96.3	114.0	142.6	754	578
Horses	38.2	36.1	15.0	238	69

The productivity of domestic animals is low; e.g. the milk yield per cow was 1.6 tons in 1956, as compared to 2.5 in the U.S.A., 2.9 in Britain, and 3.9 in the Netherlands.

Forestry. The forested area is about 3,900,000 sq. m., or 45 per cent of the total area of R., or a quarter of the forested area of the world. Up to 80 per cent consists of coniferous species. 70 per cent of all forests are in Siberia and the Far E., but the timber industry is largely concentrated in the centre and N. of European R., where the forests are more easily accessible. In central R. they are rapidly disappearing. Timber felling rose from 40,000,000 cub. yds in 1913 to 280,000,000 cub. yds in 1955.

Fishery. The fish catch amounted to 2,498,000 tons in 1955 compared to 1,048,000 in 1913. The main fishing grounds are now the seas of the Far E. and the Caspian Sea. The R. Volga and its tribs., as well as the Sea of Azov, have during the last 2 decades lost most of their former fish riches as a result of pollution of the water and haphazard fishing.

Industry. Modern industry developed in R. during the 19th cent.

Further impetus to industrialisation has been given by the Five Year Plans (q.v.) since the 1930's. The progress of various branches of industry is shown in the following table:

Output	Unit	1913	1940	1955
Coal (including soft coal)	million tons	29.15	165.9	391.0
Oil	million kWh.	10.3	31.1	70.8
Electricity	million kWh.	2000	48,300	170,100
Pig iron	million tons	4.2	14.9	33.3
Steel	million tons	4.3	18.3	45.3
Cars	1000	—	145.4	445.3
Cement	million tons	1.8	5.7	22.5
Cotton fabrics	million yds	2921	4324	6457
Sugar	million tons	1.4	2.2	3.4

Communications. Freight traffic by all means of transportation was in 1940 4.3 times greater than in 1913, and 10.2 times greater in 1956; passenger traffic rose 3.8 and 6.2 times respectively. Rail-

ways carried in 1913 57.4 per cent of all goods, water transport 42.9 per cent, motor transport 0.1 per cent, and pipelines 0.3 per cent; in 1940 the figures were 85.1 per cent, 12.3 per cent, 1.8 per cent, and 0.8 per cent respectively, and in

1955 83.4 per cent, 11.7 per cent, 3.7 per cent, and 1.2 per cent. Total length of railways rose from 71,700 km. in 1913 to 120,700 in 1955 (c. 66 per cent single track, 5400 km. electrified), and the number of passengers from 248,500,000 to 1,641,400,000; 3,778,000,000 letters were sent in 1955 as compared to 615,000,000 in 1913. There were in 1955 6,100,000 wireless and 800,000 television sets in the country.

Trade. In 1955 62.9 per cent of retail trade was carried out by state shops.

Index of Retail Prices (1940 = 100)

	1950	1955
State shops	186	138
Food	203	141
Other goods	165	134
Kolkhoz market	104	111

28.0 per cent by co-operative shops, and 9.1 per cent at the *kolkhoz* markets, at which peasants may sell their produce after fulfilling compulsory deliveries.

The value of foreign trade (export and import together) increased from \$780 m.

in 1937 to \$6250 m. in 1954. The bulk of it is now carried on with the countries of the Communist bloc (78.4 per cent in 1954). Of the non-Communist countries Britain takes the first place (\$116.9 m

export from R. and \$39.5 m. import in 1954).

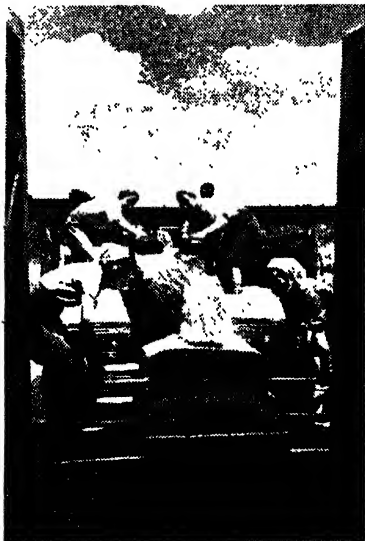
Structure of Foreign Trade

	1913	1955
Export	%	%
Machinery and equipment	0.3	22.1
Fuel and raw materials	42.8	59.9
Grain and consumer goods	56.9	18.0
Import		
Machinery and equipment	15.9	33.0
Fuel and raw materials	63.4	48.0
Consumer goods	20.7	19.0

Economic Regions. The main industrial regions of R. are the Central Industrial Region around Moscow with large and varied engineering, chemical, and textile industries; the S. Industrial Region (q.v.), with coal mining, iron and steel, and heavy engineering; the Urals (q.v.), with ferrous and non-ferrous metallurgy, and heavy engineering and chemical industries; and the Kuznetsk Basin (q.v.), with coal mining and metallurgy. Outside these regions Leningrad and most of the other big cities have large and varied industries. The chief oil-producing areas are the Volga-Urals Basin (q.v.) and Baku in Transcaucasia. Since the First World War both the mining and the secondary industries have been developed far more rapidly in the E. parts of R., and this is to continue. Agriculture is largely concentrated in the wooded steppe and steppe areas, and to a lesser extent in the mixed-forests area. Here also the tendency is to shift eastwards (see VIRGIN LAND CAMPAIGN).

Economic Organisation. The basic means of production—land, other natural resources, and factories—as well as banks were nationalised in 1917–18 soon after the Bolshevik seizure of power (see OCTOBER REVOLUTION). An attempt to run the economy on what was considered at the time Communist lines (see WAR COMMUNISM) was given up in 1921 and replaced by the New Economic Policy (q.v.), which brought considerable concessions to the peasants and permitted private enterprise in retail trade and to some extent in industry. The collectivisation of agriculture (q.v.), 1929–34, replaced individual peasant holdings with collective farms (see KOLKHOZ) managed under the direction of dist. party and agric. authorities. The bulk of agric. machinery is concentrated in the state-owned Machine-Tractor Stations (see M.T.S.) which have a share in directing the *kolkhozes*. State farms are of secondary importance, though they predominate in the areas brought under cultivation during the Virgin Land Campaign (1953–6). The inauguration of the Five Year Plans (q.v.) in 1928 brought an end to the

New Economic Policy in industry and trade. The organisation of management in the state industries has undergone sev. changes, alternating between greater and lesser centralisation and between branch and 'functional' management. The latest reform (1957) has concentrated operative management in the 105 regional Economic Councils while retaining the overall planning and investment policy in the hands of the State Planning Committee. The reform has strengthened the position of the party apparatus in economic management. On the factory and the



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WHEAT HARVEST AT THE STALIN COLLECTIVE FARM IN THE STAVROPOL' KRAY OF THE R.S.F.S.R.

The grain of the new harvest is being prepared for delivery to the seed stock.

trust levels the principle of 'single head management' has been followed since the 1930's. Material interest is the most universally applied incentive, both for manual and for managerial and technical staff. It is supplemented by such devices as the semi-bogus 'socialist emulation' between regions, factories, teams, or individual workers, and such largely fictitious 'movements' as the Shock Workers and the Stakhanov Movements (qq.v.). From the early 1930's the Corrective Labour Camps (q.v.) were an important form of economic organisation, particularly in the Far N., and on big construction projects, but since the mid-1950's their role has diminished. Clumsiness in the bureaucratic management of

the economy, inadequate planning, and perpetual shortage of supplies lead to widespread practices of lobbying and 'wangling,' of illicit bargaining and barter between enterprises.

GOVERNMENT. The overthrow of the Provisional Government (q.v.) by the Bolsheviks in 1917 (see OCTOBER REVOLUTION) and the dispersal of the Constituent Assembly (q.v.) estab. the so-called Dictatorship of the Proletariat (q.v.) exercised by the Communist party, partly through the Soviets. It was officially ended with the adoption in 1936 of the Stalin Constitution, which ostensibly introduced democratic parliamentary gov., though the designation Soviets was retained for the elected assemblies, now based on universal suffrage. Yet simultaneously the constitution defined the role of the Communist party as 'the leading core of all organisations, both public and state' and stipulated that candidates for the elections to Soviets can be put up by the Communist party and the 'public organisations' led by it. In practice only 1 candidate is put up in every constituency. Thus effective gov.

is exercised by the Communist party. The party's highly centralised structure ensures that power is concentrated in its central apparatus and in the hands of the self-appointed clique which runs it and is referred to officially as 'the leaders of the party and the Gov.'. Such interests as do receive consideration usually achieve this through informal pressure. An important role is played in the exercise of power by the security organs, though this has greatly diminished in the post-Stalin period. See further under COMMUNIST PARTY OF THE SOVIET UNION; K.G.B.; POLITBURO; SOVIET; STALINISM; U.S.S.R.

Administrative Territorial Divisions. R. is formally a federal state, the Union of Soviet Socialist Republics (U.S.S.R.), consisting of 15 constituent reps. The larger of these are divided into provs. called *oblast* or *krai* (qq.v.), and some of them also include Autonomous Soviet Socialist Republics (A.S.S.R.) and Autonomous Oblasts (A.O.). The following table shows the administrative territorial divisions in 1957 (pop. 1956); because of recent boundary changes not all areas are given.

Division	Area (sq. m.)	Pop. (^{'000s})	Capital
I. Russian Federal S.S.R.	6,570,400	113,225	Moscow
A. European North			
1. Archangel Oblast ¹	229,400	1,205	Archangel
2. Komi A.S.S.R.	156,200	670	Sykt'ykar
3. Vologda Oblast	56,900	1,297	Vologda
B. North-West			
4. Kaliningrad Oblast	6,100	621	Kaliningrad
5. Karelian A.S.S.R.	68,900	615	Petrozavodsk
6. Leningrad Oblast	32,800	4,364	Leningrad
7. Murmansk Oblast	57,800	474	Murmansk
8. Novgorod Oblast	20,700	718	Novgorod
9. Pskov Oblast	12,200	563	Pskov
C. Centre			
10. Balashov Oblast ¹		964	Balashov
11. Belgorod Oblast		1,190	Belgorod
12. Bryansk Oblast	13,400	1,551	Bryansk
13. Chuvash A.S.S.R.	7,100	1,095	Cheboksary
14. Gor'kiy Oblast	29,100	3,468	Gor'kiy
15. Ivanovo Oblast	9,500	1,351	Ivanovo
16. Kalinin Oblast	25,500	1,604	Kalinin
17. Kaluga Oblast	11,800	895	Kaluga
18. Kirov Oblast	47,000	1,919	Kirov
19. Kostroma Oblast	22,400	897	Kostroma
20. Kursk Oblast		1,464	Kursk
21. Lipetsk Oblast		1,131	Lipetsk
22. Mari A.S.S.R.	8,900	643	Yoshkar-Ola
23. Mordva A.S.S.R.	10,100	1,000	Saransk
24. Moscow Oblast		10,505	Moscow
25. Orël Oblast		915	Orël
26. Penza Oblast	16,700	1,515	Penza
27. Ryazan' Oblast		1,412	Ryazan'
28. Smolensk Oblast	18,900	1,166	Smolensk
29. Tambov Oblast	13,200	1,501	Tambov
30. Tula Oblast		1,895	Tula
31. Velikiye Luki Oblast ¹	17,300	658	Velikiye Luki
32. Vladimir Oblast	10,350	1,355	Vladimir
33. Voronezh Oblast		1,897	Voronezh
34. Yaroslavl' Oblast	14,250	1,371	Yaroslavl'

¹ Abolished in 1957.

<i>Division</i>	<i>Area (sq. m.)</i>	<i>Pop. (‘000s)</i>	<i>Capital</i>
<i>D. Volga Area</i>			
35. Astrakhan' Oblast . . .		666	Astrakhan'
36. Kuybyshev Oblast . . .	20,800	2,196	Kuybyshev
37. Saratov Oblast . . .	39,500	1,737	Saratov
38. Stalingrad Oblast . . .		1,447	Stalingrad
39. Tatar A.S.S.R. . . .	26,100	2,784	Kazan'
40. Ul'yanovsk Oblast . . .	14,400	1,126	Ul'yanovsk
<i>E. N. Caucasus</i>			
41. Chechen-Ingush A.S.S.R. ¹		544	Groznyy
42. Dagestan A.S.S.R. . . .		958	Makhachkala
43. Kabarda-Balkar A.S.S.R. ¹		359	Nal'chik
44. Kamensk Oblast ² . . .		1,350	Shakhty
45. Krasnodar Kray . . .		3,604	Krasnodar
including Adyge A.O. . .	1,700	270	Maykop
46. N. Ossetian A.S.S.R. . .		417	Ordzhonikidze
47. Rostov Oblast . . .		1,922	Rostov-on-Don
48. Stavropol' Kray . . .		1,866	Stavropol'
including Kalmyk A.O., ¹		118	Elista
Karachay - Circassian			
A.O. ¹		214	Cherkessk
<i>F. Urals</i>			
49. Bashkir A.S.S.R. . . .	55,400	3,223	Ufa
50. Chelyabinsk Oblast . . .	33,900	2,767	Chelyabinsk
51. Orenburg Oblast . . .	47,400	1,776	Orenburg
52. Perm' Oblast . . .	65,900	2,883	Perm'
53. Sverdlovsk Oblast . . .	74,600	3,727	Sverdlovsk
54. Udmurt A.S.S.R. . . .	16,200	1,285	Izhevsk
<i>G. W. Siberia</i>			
55. Altay Kray . . .	101,000	2,579	Barnaul
including Gorno-Altay			
A.O.	35,800	156	Gorno-Altaysk
56. Kemerovo Oblast . . .	36,900	2,626	Kemerovo
57. Kurgan Oblast . . .	27,500	982	Kurgan
58. Novosibirsk Oblast . . .	69,000	2,208	Novosibirsk
59. Omsk Oblast . . .	53,800	1,606	Omsk
60. Tomsk Oblast . . .	121,400	751	Tomsk
61. Tyumen' Oblast . . .	526,300	1,088	Tyumen'
<i>H. E. Siberia</i>			
62. Buryat-Mongol A.S.S.R.	135,700	650	Ulan-Ude
63. Chita Oblast . . .	168,200	1,009	Chita
64. Irkutsk Oblast . . .	301,900	1,757	Irkutsk
65. Krasnoyarsk Kray . . .	928,000	2,474	Krasnoyarsk
including Khakas A.O. . .	24,000	408	Abakan
66. Tuva A.O.	66,100	168	Kyzyl
67. Yakut A.S.S.R. . . .	1,182,300	483	Yakutsk
<i>I. Far East</i>			
68. Amur Oblast . . .	139,000	737	Blagoveshchensk
69. Kamchatka Oblast . . .		209	Petropavlovsk-
			Kamchatskiy
70. Khabarovsk Kray . . .	328,000	1,140	Khabarovsk
including Jewish A.O. . .	13,800	157	Birobidzhan
71. Magadan Oblast . . .		240	Magadan
72. Maritime Kray . . .	64,900	1,305	Vladivostok
73. Sakhalin Oblast . . .	35,400	689	Yuzhno-Sakhalinsk
<i>II. Ukrainian S.S.R.</i>			
1. Cherkassy Oblast . . .	222,600	40,600	Kiev
2. Chernigov Oblast . . .		1,500 ²	Cherkassy
3. Chernovtsy Oblast . . .	12,200	1,560	Chernigov
4. Crimean Oblast . . .	3,200	780	Chernovtsy
	10,000	1,100	Simferopol'

¹ Re-established 1957.² Abolished in 1957.³ Pop. figures for oblasts in this section are 1955.

<i>Division</i>	<i>Area (sq. m.)</i>	<i>Pop. (¹000s)</i>	<i>Capital</i>
5. Dnepropetrovsk Oblast	12,600	2,460	Dnepropetrovsk
6. Drogobych Oblast	4,000	850	Drogobych
7. Khar'kov Oblast	12,000	2,440	Khar'kov
8. Kherson Oblast	10,600	790	Kherson
9. Khmel'nitskiy Oblast	8,000	1,620	Khmel'nitskiy
10. Kiev Oblast		2,670	Kiev
11. Kirovograd Oblast		1,200	Kirovograd
12. L'vov Oblast	4,300	1,220	L'vov
13. Nikolayev Oblast		990	Nikolayev
14. Odessa Oblast		1,930	Odessa
15. Poltava Oblast		1,640	Poltava
16. Rovno Oblast	8,000	910	Rovno
17. Stalino Oblast	10,200	3,860	Stalino
18. Stanislav Oblast	5,400	1,090	Stanislav
19. Sumy Oblast	9,400	1,530	Sumy
20. Ternopol' Oblast	5,300	1,080	Ternopol'
21. Transcarpathian Oblast	5,000	920	Uzhgorod
22. Vinnitsa Oblast	10,600	2,140	Vinnitsa
23. Volhynia Oblast	7,700	870	Lutsk
24. Voroshilovgrad Oblast	10,300	2,170	Voroshilovgrad
25. Zaporozh'ye Oblast	10,400	1,370	Zaporozh'ye
26. Zhitomir Oblast	11,600	1,570	Zhitomir
III. <i>Belorussian S.S.R.</i>	80,100	8,000	Minsk
1. Brest Oblast		1,180 ¹	Brest
2. Gomel' Oblast		1,310	Gomel'
3. Grodno Oblast		950	Grodno
4. Minsk Oblast		1,600	Minsk
5. Mogilev Oblast		1,120	Mogilev
6. Molodechno Oblast		850	Molodechno
7. Vitebsk Oblast		900	Vitebsk
IV. <i>Moldavian S.S.R.</i>	13,100	2,700	Kishinev
V. <i>Lithuanian S.S.R.</i>	31,200	2,700	Vilnius
VI. <i>Latvian S.S.R.</i>	24,600	2,000	Riga
VII. <i>Estonian S.S.R.</i>	17,400	1,100	Tallinn
VIII. <i>Georgian S.S.R.</i>	29,400	4,000	Tiflis
including Abkhaz A.S.S.R.	3,300	394	Sukhumi
Adzhar A.S.S.R.	1,100	238	Batumi
S. Ossetian A.O.	1,500	98	Staliniri
IX. <i>Azerbaijani S.S.R.</i>	33,100	3,400	Baku
including Nakhichevan' A.S.S.R.	2,100	129	Nakhichevan'
Nagorno-Karabakh A.O.	1,700	129	Stepanakert
X. <i>Armenian S.S.R.</i>	11,500	1,600	Yerevan
XI. <i>Kazakh S.S.R.</i>	1,061,600	8,500	Alma-Ata
1. Akmolinsk Oblast	59,000	540 ¹	Akmolinsk
2. Aktyubinsk Oblast	114,700	370	Aktyubinsk
3. Alma-Ata Oblast	41,700	755	Alma-Ata
4. Dzhambul Oblast	52,000	510	Dzhambul
5. E. Kazakhstan Oblast	37,300	690	Ust'-Kamenogorsk
6. Gur'yev Oblast	98,600	270	Gur'yev
7. Karaganda Oblast	156,700	850	Karaganda
8. Kokchetav Oblast	28,600	410	Kokchetav
9. Kustanay Oblast	76,700	540	Kustanay
10. Kzyl-Orda Oblast	88,900	310	Kzyl-Orda
11. N. Kazakhstan Oblast	17,600	420	Petropavlovsk
12. Pavlodar Oblast	53,600	400	Pavlodar
13. Semipalatinsk Oblast	67,800	440	Semipalatinsk
14. S. Kazakhstan Oblast	61,500	850	Chimkent
15. Taldy-Kurgan Oblast	46,200	440	Taldy-Kurgan
16. W. Kazakhstan Oblast	60,900	340	Ural'sk

¹ Pop. figures for oblasts in this section are 1955.

<i>Division</i>	<i>Area (sq. m.)</i>	<i>Pop. (^{'000s})</i>	<i>Capital</i>
XII. <i>Uzbek S.S.R.</i>	157,400	7,300	Tashkent
1. Andizhan Oblast	1,600	700 ¹	Andizhan
2. Bukhara Oblast	49,600	520	Bukhara
3. Fergana Oblast	3,100	850	Fergana
4. Kara-Kalpak A.S.S.R.	61,600	430	Nukus
5. Kashka-Dar'ya Oblast	11,300	420	Karshi
6. Khorezm Oblast	1,900	380	Urgench
7. Namangan Oblast	2,400	530	Namangan
8. Samarkand Oblast	12,300	1,030	Samarkand
9. Surkhan-Dar'ya Oblast	7,700	340	Termez
10. Tashkent Oblast	5,900	1,975	Tashkent
XIII. <i>Kirghiz S.S.R.</i>	76,100	1,880	Frunze
1. Dzhahal-Abad Oblast	9,200	280	Dzhahal-Abad
2. Frunze Oblast	12,400	790	Frunze
3. Issyk-Kul' Oblast	16,300	220	Przheval'sk
4. Osh Oblast	17,000	580	Osh
5. Tien-Shan Oblast	21,200	110	Naryn
XIV. <i>Tadzhik S.S.R.</i>	54,900	1,800	Stalinabad
Including Leninabad Oblast	9,400	590 ¹	Leninabad
Gorno-Badakhshan A.O.	23,600	60	Khorog
XV. <i>Turkmen S.S.R.</i>	187,200	1,400	Ashkhabad
1. Ashkhabad Oblast	87,600	480 ¹	Ashkhabad
2. Chardzhou Oblast	35,900	290	Chardzhou
3. Mary Oblast	34,700	310	Mary
4. Tashauz Oblast	29,000	260	Tashauz

¹ Pop. figures for oblasts in this section are 1955.

Legal System. From the 1860's (see GREAT REFORMS) R. had a well-functioning modern legal system. It was destroyed by the Bolsheviks when they seized power in 1917 (see OCTOBER REVOLUTION) and for a time the principle of 'revolutionary conscience' was substituted for that of law and order. However, since the 1920's the legal system has been partly restored, and, though far from perfect, it generally does function in the fields of civil and criminal law. On the other hand, the constitutional and administrative law, as well as parts of criminal and civil law bearing on the power position of the Communist party, are largely ineffective and yield to arbitrary decisions of those in possession of actual power at a given moment. Trial by jury has not been restored. The judges in the lower courts are formally elected by popular vote, and in the provincial, republican, and the Supreme Court of the U.S.S.R. by the respective Soviets; in fact, like all other state functionaries, they are chosen by the cadres' depts of the party. Examining magistrates are not independent even in theory, being officials of the procurators' offices. The procurators (a traditional Russian institution) are appointed by, and are hierarchically subordinate to, the Procurator General. Their task is to supervise the observance of law both by citizens and by state agencies. The great extra-judicial powers of the security organs have been curtailed since 1953 and the procurators' position somewhat

strengthened. Citizens are not equal in law: peasants do not possess the internal passport, and this normally restricts their movements to their rural dist., nor are they entitled to such social services as old-age pensions or sickness benefit (the latter also applies to some categories of professional people).

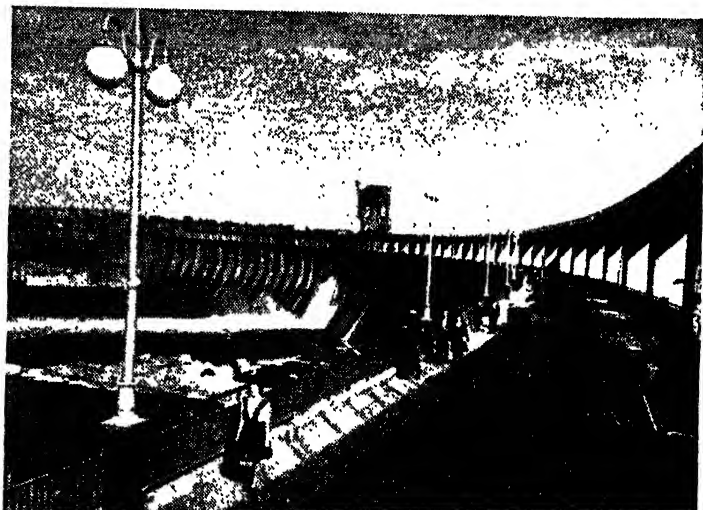
SOCIAL CONDITIONS. Social Structure. Theoretically, the Soviet society consists of 2 friendly classes—workers and peasants—and an 'intermediate stratum,' the intelligentsia (q.v.), originating from the 2 classes and serving their interests. In fact, the social structure is far more complicated, and differences in terms of income, prestige, and power are very great. There are the privileged classes of party and state officials (including the security personnel), the officers' corps, economic managers, the *élite* of the intelligentsia (scientists, higher technicians, writers, actors, etc.), the higher clergy of the recognised religious communities, and the decorative *élite* of selected old Bolsheviks and 'exemplary' workers and peasants (see STAKHANOV MOVEMENT). The bulk of the intelligentsia, white-collar employees, manual workers, and peasants can be classified together as non-privileged classes, though there are considerable differences between them as well as within each of them. Indeed, the peasants might be considered as belonging to the category of under-privileged classes, since they have certain legal disabilities. Definitely under-privileged are the deportees and the inmates of corrective

labour colonies and camps (see CORRECTIVE LABOUR CAMPS). Upward social progress within a class is comparatively easy, while entry into a higher class is far more difficult. The privileged class as a whole is now largely self-perpetuating.

Social services. Medical treatment is free, though the prescriptions must be paid for. Better medical facilities are often available on payment. There were 334,000 doctors and dentists in 1955 (28,000 in 1913) and 1,290,000 hospital beds (207,000 in 1913). Mothers with 4 or more children receive family allowances until the child is aged 5. Wage and salary earners are entitled to paid leave,

tional system in R. since 1917. The latest series of changes, reversing previous trends, was inaugurated in 1952 and is in the process of being implemented. The present situation is as follows: Universal compulsory education begins at the age of 7 and extends over 7 years. Compulsory 10-year education is to be introduced by 1960. There exist the following main types of educational institutions (apart from military, religious, and Communist party schools):

1. Pre-school kindergarten, for children aged 3-7.
2. Primary School—classes 1-4.



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THE REBUILT DNEIPER DAM AT DNEPROPETROVSK, 1950

additional paid maternity leave, sickness benefit, and retirement pensions. No unemployment benefit is paid, the official explanation being that there is no unemployment in R.; in fact, however, there is at present considerable unemployment among school-leavers. Rents in state-owned houses are related to the occupiers' income; fees for infants' crèches, kindergartens, boarding schools, and legal aid are similarly graded. Education is free (except for some specialised courses), though books, writing materials, etc., must normally be bought. Grants are available to needy and successful students and pupils of professional secondary schools, but not to pupils of ordinary secondary schools. Pupils at trade and military schools are fully maintained by the State.

EDUCATION AND LEARNING. There have been many reforms in the educa-

3. Seven-year School—classes 1-7.
4. Secondary School—classes 1-10.

In categories 2, 3, and 4 curricula are identical for the first 4 classes, and in the 2 latter for 7 classes. For 20 years (1932-52) the main emphasis in the curricula of secondary schools was on the humanities and the theoretical aspects of the sciences. Now, however, primary and secondary education is to become 'poly-technical,' i.e. more time is devoted to practical training in handicrafts, agriculture, mechanics, etc. 300 odd primary and secondary boarding schools were opened in 1956, and this medium of education is to be developed. These schools are co-educational, and fees are graded according to parents' means.

5. Trade and Technical Schools (usually boarding). Pupils are admitted after completing 7 or 10 years of ordinary

school and are given a 6 months'-3 years' apprenticeship in a manual trade. No fees are payable, and until 1955 children could be compulsorily mobilised for these schools.

6. **Professional Secondary School.** Pupils are admitted after completing 7 or 10 years of ordinary school, and are trained for intermediate technical work of all kinds—primary school teachers, nurses, factory technicians, etc.

7. **Higher educational institutions,** comprising univs. (33 in 1955), a wide variety of technical institutes, teachers' training colleges, etc. Admission is normally only after 10-year secondary education. Since 1956 no fees are charged for higher education, and grants are given to students according to need.

The policy on admission to higher education has also undergone frequent changes. Before 1957 admission was based on ability as shown in competitive entrance examinations. Now, however, preference is given (provided they pass the examination) to applicants who have at least 2 years' experience of practical work in factories, etc., and can produce certificates of 'good work and behaviour' issued by the Young Communist League. Representatives of the League and of the Communist party sit on the admission committees.

Statistics of Education (in Thousands) ¹

	1914	1940	1955
Children in kindergartens	4 ¹	1,172	1,713
Pupils in primary and secondary schools ²	9,656	35,528	30,070
Including classes 8-10	130	2,368	5,253
Pupils in professional secondary schools ³	54	819	1,674
Students in higher educational establishments ⁴	127	585	1,228
Graduates from higher educational establishments ⁵	11 ⁶	102	184

¹ Excluding military, police, religious, and party training.

² 1913.

³ Excluding adult schools (1,853,000 pupils in 1956).

⁴ Excluding correspondence pupils (287,000 in 1955).

⁵ Excluding correspondence students (639,000 in 1955).

⁶ Excluding correspondence students (62,000 in 1955).

⁷ 1915.

The U.S.S.R. Academy of Sciences (formerly Russian Academy, founded 1725) is the highest academic body in R.

It is subordinated to the Council of Ministers (it retained some autonomy till 1929) and is a combination of a learned society and a gov. dept in charge of scientific research. In its composition and work it is now heavily biased in favour of natural sciences and technology. It has dozens of research institutes and branches in various parts of the country, and is charged with co-ordinating the research work of all other institutions (except party, military, and religious ones). There are also specialised academies, e.g. the Academy of Agricultural Sciences, and republican academies of science in most constituent reps. of the U.S.S.R. The total number of public research establs. rose from 289 in 1914 to 2796 in 1956, the number of research workers and high-school teachers from 10,000 in 1913 to 224,000 in 1955, and that of graduate students from 3000 in 1930 to 21,400 in 1956 (plus 8000 correspondence students).

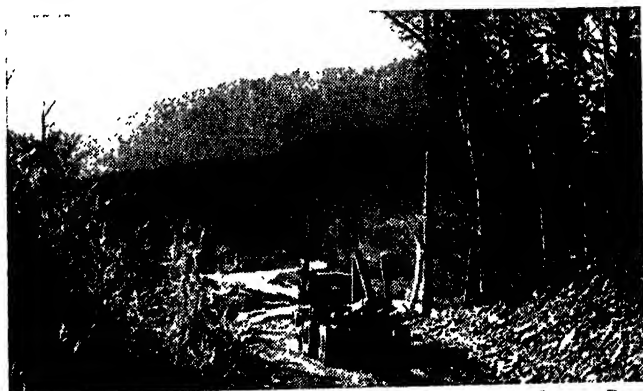
There were 147,000 public libraries in R. in 1956 (28,000 in tns and 119,000 in vils.) containing 501,000,000 vols., compared to 14,000 public libraries in 1914 (3000 in tns and 11,000 in vils.) with 9,400,000 vols. The number of museums rose from 180 in 1914 to 991 in 1941, but fell to 862 in 1956.

HISTORY. Historiography. There are 3 main trends in modern Russian historiography. Historians belonging to the Westernising trend postulate or imply the essential similarity of R.'s historical development to that of W. Europe and stress actual similarities and W. influences. They are opposed by historians of the Slavophile trend, who postulate the essential originality of Russian hist. and institutions and stress their differences from those of W. Europe. Finally, the Eurasians (q.v.) interpret Russian hist. in terms of the peculiarities of R.'s geographical and cultural position between Europe and Asia and comprising large parts of both, and particularly stress Oriental influences. Characteristic of the Westernising historiography is its primary interest in state and legal forms and economic conditions. The conservative monarchist school of Tatishchev (1686-1750) and Karamzin (q.v.) developed the first logical scheme of Russian hist. as passing through the stages of monarchy, particularisation (12th-15th cents.), and new monarchy. It was superseded by the 'historical' school headed by S. M. Solov'ev (q.v.), with its organic view of R.'s historical development in common with W. Europe, and the 'statist' school of B. N. Chicherin (1828-1904), which considered the State to be the direct creator of hist. and concentrated on the study of state institutions. An extreme Westernising position was taken up by the Marxists (see **LEGAL MARXISM**; **LENIN**; **PLEKHANOV**), who studied the development of capitalism in R., and by Pokrovskiy (q.v.) and his school, who concentrated on the hist. of the class struggle and the revolutionary movements. The Slavophile historiography is

primarily interested in conditions of everyday life and in the culture and spirit of the people, particularly of the peasants. The romantic school of Slavophiles proper (see SLAVOPHILES) contrasted communal and paternalistic tendencies manifested in Russian hist. with the individualism and legalism of the W. They were followed by Populists (see POPULISM), who saw in the peasant commune (see MIR) a distinguishing feature of Russian society which determined a different historical course for R. The neo-Slavophile theory of Berdyayev (q.v.) equates traditional Russian communalism and paternalism with totalitarianism, and interprets Russian hist. as a series of approximations to the totalitarian ideal. Most contemporary schools tend to take up intermediate positions,

ceeded in evolving distinct cultural and political traditions which they passed on to their successors in late antiquity and in the Middle Ages. See also ARMENIA; GEORGIA.

Another area of early political developments was the N. shores of the Black Sea. They were populated in succession by Kimmerians and Scythians organised in loose tribal federations, and in the 7th-6th cents. BC numerous Gk colonies were founded along the coast, which later fell under Roman and Byzantine domination (see also BOSPORAN KINGDOM; CHERSONESUS; CRIMEA). In the first cents. AD the Black Sea steppes witnessed invasions both from the W. (Goths, q.v., who set up a large but ephemeral state) and from the E. (Huns, AVARS, q.v.).



Camera Press

THE ISLAND OF SAKHALIN: FOREST REGION

combining features of the different main trends. Thus the Eurasian school assimilated sev. points of the étatists and the Slavophiles. The liberal historian Klyuchevskiy (q.v.), author of the first 'economist' theory of Russian hist. as that of 'a country in the process of being colonised,' continued some traditions of the historical and the étatist schools. Mil'yukov's and Platonov's (qq.v.) views were of a similar kind. The National Bolshevik (see NATIONAL BOLSHEVISM) school headed by Grel'ov (q.v.) combined Marxist, étatist, and Eurasian traits.

Ancient Russia. The first states on the ter. of present-day R. arose in Transcaucasia (see URARTU) and Central Asia (Khorezm, Sogdiana) in the 9th-6th cents. BC. Constantly threatened by their stronger neighbours, the Assyrians and Persians, and periodically subdued by them as well as by conquerors from more distant lands (Alexander the Great, the Romans), the early Transcaucasian and Central Asian states nevertheless suc-

Kievan Russia. By the 6th cent. AD the forested country N. of the steppes, in the Dnieper basin and farther N., was inhabited by the various E. Slav tribes. In the W., beyond the W. Bug, they bordered on the W. Slavs; in the NW., on the Niemen and W. Dvina, lived the Lithuanian tribes, ancestors of the Lithuanians and Latvians; in the N., from the Gulf of Finland to the upper Volga, various Finnish tribes, some of which survived to form the present Finnish peoples (see FINNS), while others were later assimilated by the Slavs (see GREAT RUSSIANS); in the E. powerful states were set up by 2 Turkic-speaking peoples, the Bulgarians (see VOLGA BULGARIANS) on the middle and the Khazars (q.v.) on the lower Volga.

There were 3 early centres of political consolidation among E. Slavs—in Volhynia (q.v.) on the W. Bug, on the middle Dnieper around Kiev, and in the N. around Lake Il'men'. In the 9th cent. the N. centre fell to the Scandinavian

Vikings (see RURIK), who soon extended their domination over the whole area of the E. Slavs and some neighbouring tribes and thus founded the first all-Russian state with the cap. in Kiev (see also KIEVAN RUSSIA). The powerful and prosperous Kievan state, which destroyed the Khazar Khanate and kept in check the nomadic Pechenegs and Cumans (q.v.), who constantly assailed it from the S. steppes, fell under Byzantine cultural influence, and in 988 embraced Christianity. Less than a cent. later, however, it began to split up. Gradual weakening of the centre and constant feudal strife resulted in the break-up of the state. The 11th and 12th cents. witnessed the strengthening of territorial principalities (see CHERNIGOV; GALICIA; POLOTSK; SMOLENSK; SUZDAL; VOLHYNIA). By the early 13th cent. the grand principality of Vladimir (q.v.) in the N.E., the Novgorod (q.v.) rep. in the N., and the Kingdom (q.v.) of Galicia and Volhynia in the SW. dominated the Russian scene.

Mongols and Russia. In 1236 the Mongol armies appeared on the Volga. During the previous 3 decades the Mongols had conquered China, Central Asia, Iran, and Transcaucasia, and set up sev. semi-independent states whose rulers recognised the suzerainty of the Great Khan. Now Batu Khan (see BATU), who ruled over the steppes N. of the Aral Sea and Lake Balkhash, rapidly extended his realm to the W. Within 4 years he conquered the Volga Bulgarians and one by one the disunited Russian principalities except Novgorod. The Russian princes became vassals of Batu's state, the Golden Horde (q.v.).

A cent. later the Horde began to loosen its grip over the vassal ters. During the 14th cent. most W. and S. Russian principalities escaped the Tatar domination and passed under the new power, the Grand Duchy of Lithuania, founded in the mid-13th cent. (see also LITHUANIA). A parallel process took place in the ter. still retained by the Horde, where the principality of Moscow—at first small—during the 14th cent. absorbed many of its neighbours until it felt strong enough to challenge the Horde. Dmitry Donskoy (q.v.), at the head of a coalition of Russian princes, defeated the Tatars in 1380. Yet for another 100 years Moscow continued to pay tribute to the Tatars. The Golden Horde broke up into a number of khanates (see entries on the Astrakhan', Crimea, Kazan', and Siberian khanates) in the 15th cent., and these continued to decline, while the grand principality of Moscow continued to absorb its neighbours and rivals and finally proclaimed the unification of all Russian lands as its official programme (see also MOSCOW). Ivan III (q.v.) subdued the great rep. of Novgorod, which had previously successfully defended itself against the Swedes, the Teutonic Knights (q.v.), and Lithuania. Ivan the Terrible (q.v.) went beyond the former limits of Kievan Russia and, continuing

the struggle against the Tatars, conquered the Kazan' (1552) and the Astrakhan' khanates. The conquest of Siberia (q.v.), also begun in his reign, was completed in the next cent.

Muscovite Russia. Alongside the external growth of the Muscovite state went its internal consolidation. The feudal traditions and the power of the boyars (q.v.) were stamped out by the new coalition of monarchy and the lower gentry. Ivan the Terrible, who assumed the title of Tsar (q.v.) of All Russia, pursued this policy with exceptional cruelty.



National Film Library

IVAN IV

A scene from the film *Ivan the Terrible*. The tsar, who had retired to Alexandrov after betrayal and treachery by his followers, looks down from a hilltop on a procession of people from Moscow come to plead for his return.

A violent reaction against this strengthening of the power of the tsar and the gentry (the latter also in relation to the peasants) was the Time of Troubles (see TROUBLES, TIME OF), a prolonged period of near-anarchy, civil wars, and foreign invasions which nearly cost R. its national survival. The victory of the patriotic forces of Minin (q.v.) and Prince Pozharskiy signified also the victory of the centralised state. The tears of the new house of Romanov (q.v.) continued the policy of their predecessors. The Code of Law passed by the Zemskiy Sobor (q.v.) in 1649 thoroughly applied the principle of universal service to the State by all classes and finally estab. peasant serfdom in R. The peasants never reconciled themselves to their new status, and the

following 2 cents. of serfdom were punctuated by sev. large-scale peasant rebellions (see PUGACHEV; RAZIN). R. did not escape the atmosphere of religious conflict prevalent in 17th-cent. W. Europe. The reforming activities of patriarch Nikon (q.v.) led to a split in the Orthodox Church which is still unhealed.

The religious issue played an important part also in Muscovy's relations with her W. neighbour, Poland. After Lithuania was united with Poland in 1569 the latter took over Lithuania's former role as

the concert of Great Powers of Europe. Through conquests from Sweden and Turkey, and the partitions of Poland, it extended its ter. in the W. and S. to include the Baltic Provinces (q.v.), Belorussia, Lithuania, the Ukraine W. of the Dnieper, and the Black Sea shores (see NEW RUSSIA). Internally it was a period of the growth of manufactures, education, and learning (Moscow Univ. founded 1755), the increasing influence of the Westernised gentry, frequent palace revolutions, and the beginning of modern



W. F. Munsell

ALEXANDER I PRESENTS TO NAPOLEON SOME KALMYKS, COSSACKS, AND BASHKIRS OF THE RUSSIAN ARMY: JULY 1807

From the painting by Bergeret in the Louvre.

Muscovy's rival for hegemony in R. Catholic Poland was at a disadvantage in the struggle for the Orthodox pop. of Belorussia and the Ukraine. When the Ukrainian Cossacks (see COSSACKS) under Khmel'nytskyy (q.v.), having risen against the Poles and liberated their country, found themselves unable to preserve their independence, they decided to join Muscovy (1654, see also UKRAINE). However, half of the Ukraine was soon again lost to Poland, and not regained until the partitions of Poland in the late 18th cent.

Imperial Russia. A new epoch in the hist. of R. was inaugurated by Peter the Great (q.v.), who transformed the old Muscovite state into a Westernised empire. Throughout the 18th cent. Imperial R. was an active participant in

literature (see RUSSIAN LITERATURE) and social criticism (A. N. Radishchev). See also under the individual emperors.

The first half of the 19th cent. was in many ways a continuation of the 18th. The new territorial acquisitions (Finland, Poland, Bessarabia, and the Caucasus) were a direct continuation. Peter the Great and Catherine II, the philosophy of Enlightenment, Lomonosov (q.v.), and Radishchev were the main sources of inspiration in administration (see also ALEXANDER I; NICHOLAS I; SPERANSKIY) and intellectual life. The most important new elements were the influence of the Fr. revolution and the experience of the Napoleonic wars. Close contact with W. Europe and the sense of the strength of the people gained in the victorious Patriotic War of 1812 produced

the first revolutionary movement, the Decembrists (q.v.). The ensuing conservative policy of Nicholas I and the growing bureaucratisation were blamed by public opinion for R.'s defeat in the Crimean War (q.v.).

Great Reforms, Reaction, and Revolution. The quest for reform, for a modernisation of the social and political life of the country, was strong and widespread, and the reign of Alexander II (q.v.) was a time of Great Reforms (q.v.) which began with the emancipation of the serfs in 1861. It was also the time when a new force appeared on the political scene—the intelligentsia (q.v.). This was partly liberal and reformist, partly radical and revolutionary. The liberals, though divided into two camps—the Westernisers (q.v.) and the Slavophiles (q.v.)—took an active part in introducing and implementing the reforms, while the radicals, who mostly belonged to the Populist movement (see POPULISM), finally adopted the tactics of terror and assassinated the Tsar Liberator (1881) before, to use the then current phrase, 'the edifice of reforms was crowned' by the estab. of a representative assembly.

Since then revolution has remained a constant theme of Russian hist. The next 2 reigns were filled with efforts by the monarchy, increasingly estranged from public opinion, to reassert the principle of autocracy. The last decades of the 19th cent. were a time of rapid industrial development behind protective tariffs, growth of the industrial working-class, and the beginnings of the labour movement and of modern factory legislation. The local gov. bodies (see ZEMSTVO) did splendid work, particularly in the fields of education and medical services. Yet the central gov. remained in the hands of a bureaucracy which was openly hostile to the very ideas of political freedom and popular representation, and which relied on the police to preserve the existing order. The regime was especially oppressive to the religious and linguistic minorities, reviving the memory of 17th-cent. Muscovy. In these conditions the first political parties, both those with all-Russian aims (see RUSSIAN SOCIAL DEMOCRATIC LABOUR PARTY; SOCIALIST REVOLUTIONARIES) and those representing particular aims of minorities (see BUND; DASHNAKTSUTYUN), were perforce semi-conspiratorial illegal organisations. Alexander III (q.v.) was firm in repression and on the whole successful, but his son Nicholas II (q.v.) failed miserably. His vacillating policy allowed the revolutionary parties and the constitutional movement (the latter depending largely on the *zemstvos* and professional associations) to gather momentum, which, together with the reverses in the Russo-Japanese war (q.v.), brought about the Revolution of 1905 (q.v.).

R. emerged from 2 years of revolution with a constitution that was far from perfect but left much to ordinary current legislation, with a legislative Duma (q.v.) elected by popular vote, with legal

parties (see CONSTITUTIONAL DEMOCRATS; OCTOBRISTS), and with trade unions. Although the gov. was still not responsible to the Duma, this reform, too, seemed only a matter of time. With the appearance of the Vekhi (q.v.) movement among the liberal intelligentsia and of the 'liquidationist' trend in Social Democracy (see MENSHÉVIKS), the foundations were laid for a responsible and undogmatic liberal and labour opposition. The gov. itself inaugurated eminently sensible agrarian reforms (see STOLYPIN) to remove the causes of peasant discontent. Industry was booming. But all these healthy developments were cut short by the First World War.

R. had taken an active part in the imperialist exploits of the Great Powers. For a long time she was Britain's chief rival in Asia. The area of contention shifted from Turkey and the Caucasus to Central Asia, most of which was conquered by R. under Alexander II, and to the Far E., where Britain backed Japan against R. The emergence of Germany as a strong imperialist power, and antagonism to Austria-Hungary in the Balkans, where R. pursued a consistent pro-Slav policy, weakened the 'alliance of 3 emperors' which Alexander III considered an instrument for stabilising peace in Europe. The Franco-Russian treaty (1891) reversed the previous alignment of powers. Nicholas II continued his father's policy of peace in Europe and took the initiative in calling the Hague conference of 1899. But he was unable to resist the drift towards catastrophe.

In R. the First World War further exacerbated the relations between, on one hand, the public, now organised in the *zemstvos* and Municipal League, the War Industries Committee, and the Progressive Bloc in the Duma (see GUCHKOV; MILYUKOV), and, on the other, the court and the gov. (see ALEXANDRA FEODOROVNA; RASPUTIN). The bloodless February revolution (q.v.) in 1917 was welcomed by almost everyone. But the democratically minded Provisional Gov. (q.v.) proved unequal to the tremendous task of building a new statehood on the ruins of the monarchy in the midst of an unprecedented war and, above all, in the face of a new phenomenon—the emergence on the political scene of a totalitarian party, the Bolsheviks.

The Communist dictatorship (1917-). The Bolsheviks originated as a radical wing of the Social Democratic party and remained under this guise until after 1917. But the founder and leader of the Bolshevik party, Lenin, had early concentrated on elaborating organisational and tactical principles of attaining and keeping power, and on training his followers in the implementation of these devices (see also BOLSHÉVISM; ISKRA; LENIN). In conditions of absolute freedom and near-anarchy after the February revolution the Bolsheviks, led by Lenin and Trotsky (q.v.), and assisted financially by the Ger. general staff, formed

private armed detachments (*see* RED GUARDS), gradually neutralised the Armed Forces and the majority of the pop. by propaganda, and in October seized power (*see* OCTOBER REVOLUTION).

At first the Bolsheviks called their gov. the Provisional Workers' and Peasants' Gov., but having suffered a decisive defeat in the elections to the Constituent Assembly (q.v.) they dispersed the Assembly and proclaimed a Dictatorship of the Proletariat (q.v.), which was to be exercised by the Communist party (*see* COMMUNIST PARTY OF THE SOVIET UNION) through the Soviets (*see* SOVIET) and the Cheka (q.v.) as well as directly. Armed resistance to the Communist

New Economic Policy (q.v.) of concessions to peasants, private enterprise and consumers. The period of the N.E.P. (1921-7) was one of restoration of the economy, but also a period of consolidation of the political monopoly of the Communist party (*see also* G.P.U.). In the party itself it was a period of struggle for Lenin's succession and of the gradual emergence of Stalin (q.v.) as the dominant figure.

Having ousted his opponents, Stalin launched his policies of rapid expansion of heavy industry (*see* FIVE YEAR PLANS), forced Collectivisation of Agriculture (q.v.), and the so-called cultural revolution, i.e. elimination of the old profes-



Topical Press

LENIN ADDRESSING A MEETING

dictatorship developed into a civil war, which raged for 3 years (1918-21). Thanks to their skill in demagogic propaganda, the Communists mustered greater support, particularly among the peasants, than did their opponents, though the majority of the pop. remained passive. Together with the disunity in the anti-Communist camp, where sectional interests (party, class, or national in the case of non-Russian nationalities) often prevailed, this accounts for the Communist victory (*see also* CIVIL WAR, RUSSIAN).

The country was impoverished, both industry and agriculture ruined, and the people tired of the economic policy of War Communism (q.v.). Disaffection among those who had supported the Communists during the civil war found expression in strikes and uprisings (*see* ANTONOV; KRONSTADT). Lenin wisely decided to retreat, and proclaimed the

sional and technical intelligentsia and its replacement by a new one, indebted to the regime and indoctrinated. From 1934 Stalin ruled as unlimited dictator. Opposition among his own followers (*see* KINOV) precipitated the universal terror of the Great Purge (q.v.), 1937-8, which marked the culminating point of the Communist totalitarian dictatorship.

In 1939 Stalin, who until then in his foreign policy had let the Soviet Union appear as champion of peace and anti-Fascism, suddenly concluded a pact of friendship with Hitler, which enabled the latter to start the Second World War. For 2 years Stalin provided Hitler with valuable supplies, including petrol. The 2 divided between themselves the independent countries of central and E. Europe, and Stalin annexed most of the territory which R. had lost after the First World War and the revolution (*see also*

BALTIC STATES; BELORUSSIA; ~~DESS-ARABIA~~; UKRAINE), as well as N. Bukovina and E. Galicia, which had not belonged to R. (see BUKOVINA; GALICIA). The Soviet Union attacked Finland in Dec. 1939 (for which she was branded as an aggressor and expelled from the League of Nations), but the Red Army's poor showing against the determined resistance of the Finns compelled Stalin to give up the intention of annexing the whole of Finland.

Despite the friendship pact, Hitler invaded R. in 1941. Britain and the U.S.A. immediately offered assistance, and the Soviet Union joined the anti-Hitler alliance. The Ger. armies rapidly scored great successes in R. The country was at first deeply divided in its attitude to the War: many saw in R.'s defeat a means of liberation from Communism, and were even prepared to fight on the side of the invaders (see VLASOV). But the Ger. policy in the occupied areas produced a swing in popular opinion, and the War was now fought as a second Patriotic War of the Russian people. Among the military leaders who distinguished themselves the most outstanding was Marshal Zhukov (q.v.), who acquired great popularity. After the Allied victory in Europe the Soviet Union took part in the last stage of the War against Japan.

As a result of the War R. retained all the terr. annexed during the Stalin-Hitler friendship and acquired new ones (see KOENIGSBURG; KURILES; SAKHALIN). The pressure of the Soviet Army facilitated the estab. of Communist regimes in the countries of central and S.E. Europe, Manchuria, and N. Korea. This was a clear violation of the obligations undertaken by the Soviet Gov. at the Yalta and Potsdam conferences, and under the U.N. Charter and the post-war peace treaties. Together with Stalin's intransigence towards the W. Allies and obvious aggressive designs on Turkey and Persia, it split the alliance and led to the formation of the 2 great ideological and power camps, the Communist led by the U.S.S.R. and the anti-Communist led by the U.S.A.

Internally the post-war period was characterised by the suppression of the comparative freedom of the war years and the restoration of conformity, particularly in the cultural field (see SOCIALIST REALISM; ZHDANOV), by mass deportations, xenophobia, obscurantism, and anti-Semitism (see STALINISM).

When Stalin died in 1953 he was succeeded by the 'collective leadership' of his closest collaborators, among whom Malenkov, Beria, and Molotov (qq.v.) at first occupied the leading positions. Despite innumerable protestations of unity, a fierce struggle for power at once set in. Beria was defeated and executed in 1953. Malenkov ousted from the premiership in 1955, and in 1957 Malenkov, Kaganovich, and Molotov, as an 'anti-party group,' were expelled from the Central Committee of the party. The victors were Khrushchëv, Bulganin,

Mikoyan (qq.v.), and the popular war hero Zhukov, q.v. (himself relieved of his post of defence minister later in 1957). Khrushchëv as the First Secretary of the party's Central Committee, succeeded in packing the Presidium of the Committee (see POLITBURO) with his nominees. The main policy issue between the warring cliques was the scope and pace of de-Stalinisation. This process started immediately after Stalin's death out of the necessity for his successors to appear



Camera Press

NIKITA KHRUSHCHËV

different from the late despot. It proceeded intermittently under the pressure of reviving public opinion. Concessions were granted to the Army, consumers, peasants, industrial managers, scientists, writers, artists, etc. The political police (see K.G.B.) lost its preponderance in the State and much of its power. Many propaganda fictions of the Stalin era were exposed and dropped, including that of Stalin himself as the wise and benevolent leader. But the concessions, small and half-hearted as most of them were, tended only to whet the appetite, while the lessening of terror emboldened the opposition. The great strikes and uprisings in the main labour camp areas (see CORRECTIVE LABOUR CAMPS), 1953-5; the revolts in the satellite countries culminating in the Polish and Hungarian revolutions of Oct.-Nov. 1956; the appearance in R. itself of a radical reformist opposition among the intelli-

gentsia (led by the Moscow writers), as well as a revolutionary trend among the students and a growing responsiveness of certain elements of the public to the revolutionary propaganda of Russian émigrés (see N.T.S.).—all this frightens Stalin's successors. It sharpens the struggle amongst them, and they are torn between tightening the screws and slowing down the process of de-Stalinisation, on the one hand, and on the other, the necessity of initiating more reforms and making more concessions because of pressure from below.

Architecture, Art (including painting, icon painting, goldsmiths' and silversmiths' work, sculpture, film), **Ballet, Language and Literature, Music, Theatre**, see RUSSIAN ARCHITECTURE, RUSSIAN ART, BALLET, RUSSIAN LANGUAGE AND LITERATURE, RUSSIAN MUSIC, DRAMA, Russian Drama.

Defence, see RED ARMY, SOVIET AIR FORCE, SOVIET NAVY.

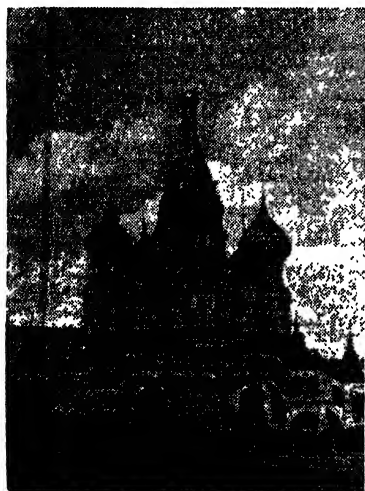
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Russian Architecture. The story of R. A. begins in 988, when Vladimir I, Grand Duke of Kiev, was converted to Christianity. Until 1462, Kiev and Novgorod were the chief cities. Owing to lack of skilled talent, architects and craftsmen had to be sent to Constantinople to be trained, and naturally they brought back the Byzantine style (see ARCHITECTURE). Of the enormous number of churches erected in Kiev within a few years of their return, three-quarters were destroyed by fire in 1124, many others by the Mongols in 1240, and most of the remainder in the Second World War. The finest were the cathedral of St Sophia at Kiev (1036, now much altered in appearance); the Lavra (1073) and St Michael (1070), both at Kiev; the Monastery of the Caves at Kiev, and the Vydubetski Monastery. The chief examples from the next century were the cathedral of the Mzhorski Monastery at Pskov; and the churches of the Intercession at Neri; of the Saviour at Neredita; and of St Nicholas the Wonderworker at Novgorod. Domes were largely used, often from 5 to 20 on a single church, and were of the characteristic Russian onion-shape.

There was no architecture of note in Moscow until 1477, when 11 architects and craftsmen directed by Aristotile Fioravanti of Bologna were imported

to rebuild the Cathedral of the Dormition. He decided to follow the Russian fashion, though utilising its methods of building. Other its designed the Palace of Facets in Moscow, and rebuilt or remodelled the Kremlin in 1485-92, producing a picturesque medley. In the Cathedral of St Basil the Beatiſied (1555), and in most other churches of the 16th-cent. the Russian plan, with numerous domes, continued to be followed.



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CATHEDRAL OF ST BASIL, MOSCOW

When the new city of St Petersburg (later Leningrad) was founded by Peter the Great in 1703, the architects chiefly employed were the Russian Zemtsov, the Italians Trezzini (who designed the Cathedral of St Peter and St Paul) and Michetti, the German Schädel, and the Frenchman Le Blond. The style of the lay-out and of the buildings followed Renaissance rather than Byzantine tradition; and under Elizabeth (1714-62) the leading architects in St Petersburg were Italians: Rastrelli (designer of the Winter Palace) and Rinaldi. Her successor, Catherine the Great, likewise employed an Italian, Quarenghi, as well as the Russians Bazhenov, Kazakov, and Starov; but also a Scot, Charles Cameron (c. 1740-1812), from 1779 onwards. His work for her included royal palaces and public buildings, many of which were destroyed in the Second World War. As in E. Europe, there was a 'Greek Revival' during the first quarter of the 19th cent., and revived classicism persisted up to the middle of that century. The leading Russian architect of that period.

Thon, designed the Church of the Annunciation at St Petersburg and the huge Cathedral of St Saviour at Moscow (1838-83, in Lombard-Byzantine style), both since destroyed. Most of the architecture of the period c. 1850-1917 was undistinguished, often shoddy in execution, and a medley of all styles.

Notable buildings erected since the 1917 Revolution include the Palace of the Soviets by Yofan, the Red Army Theatre by Alabyan, the Meyerhold Theatre by Schusev, the Lenin Library by Shuko, the Military Academy by Rudner and Munz, the Dynamo Aquatic Station by Morchan—all in Moscow; the flats for War Veterans by Simonov—in Leningrad; the Lenin Dam, by Vesnin; and the State Theatre at Novobiskrsk, by Greunberg.

Recent buildings vary in style from the stark and advanced 'functional' architecture so popular in W. Europe, to a vague striving after a new and distinctive national style. Thus the new offices of *Pravda*, by Golossov, have an excess of glass-surface most unsuitable to the severe Russian climate; while the enormous Hotel Moscow, the State Theatre at Batum, and the Metro stations suffer from over-ornamentation, gaudy colouring, and various forms of decoration too lavishly applied. Other recent examples of Soviet architecture are the Nizami Museum at Baku and the Sanatoria at Sochi.

See A. Voyce, *Russian Architecture*, 1947; T. T. Rice, *Russian Art*, 1949; G. H. Hamilton, *The Art and Architecture of Russia*, 1955.

Russian Art. Painting. Although the foundation of the Academy of Fine Arts in the 18th cent. gave the first real impetus to Russian painting, court patronage, as in the case of architecture, continued to be given chiefly to foreign painters. In the 18th cent. Russian painting continued to be almost solely devoted to portraiture. The leading Russian portrait painters of that cent. are D. G. Levitski (1735-1822), 'father of the Russian school of portraiture,' and V. L. Borovikovski (1757-1826), a pupil of Levitski, both of whom studied under It. or Fr. masters in St Petersburg. Borovikovski's 'Princess Suvorov' in the Tretyakov Gallery is full of life and charm. In Moscow Tropinin (1776-1859) was also a portrait painter with ability in characterisation. Venetsianov (1799-1847) evolved his own naturalistic style as a genre painter. His pupil, Aleksiev, the first Russian landscape painter of any real note, is outstanding as a colourist. His successors in landscape painting are Aivazovski (1817-1900) and Lebedev (1812-37). It. art strongly influenced R. in the early 19th cent., as is shown in the well-known 'Last Days of Pompeii' by Brullov (1799-1852) and the work of Ivanov (1806-58), especially in portraiture and in religious studies. Other religious painters are Ivan Kramskoi, Victor Vasnetsov, Nicholas Gay (of Fr.

descent), and Mikhail Nesterov (1882-1942). By this time Russian painting was reacting against the formalism and romanticism of the 18th and 19th cents., the prin. factor in the growth of a truly national art being the estab. of the Society for the Encouragement of Artists, in 1820. Perov (1833-82) is notable as a *genre* artist whose power as a portrait painter is shown in his 'Fyodor Dostoyevski.' Ilya Repin (1844-1930), one of R.'s foremost historical painters, exhibits powerful dramatic feeling as in his 'Ivan Embracing the Body of his Son.' As a historical painter Vassili Vereshchagin (1842-1904) is celebrated for his world-famous 'Retreat from Moscow.'

Towards the end of the 19th cent. Russian art in most spheres was influenced by a modernist and impressionist 'World of Art' movement. In 1899 A. Benois with Serge Diaghilev founded the review *Mir Iskusstva*, and from this stemmed the brilliant phase of Russian ballet design, in which the names of Benois, Léon Bakst, Nicolas Roerich, N. Goncharov, and others are eminent. In this period V. Serov (1865-1911), whose fine portrait of Nicholas II is in the Tsarkoye Selo, I. Levitan (1861-1900), and Vrubel (1856-1910), remarkable for his imaginative colouring, are notable picture painters. Ivor Grabar (b. 1871), one of the most famous painters of the pre-First World War era, and a pupil of Repin, was definitely influenced by the post-impressionism of Cézanne. After the revolution he turned chiefly to portrait-painting without, however, losing his former predilection for landscape. Also of the old or pre-Soviet generation are Sarian, whose landscapes are remarkable for their gay colouring; J. J. Mashkov, a strong colourist; and K. Petrov-Vodkin, one of the few really original painters of this period. Petrov-Vodkin's earlier pictures were strongly influenced by Fr. impressionism, and his treatment tends towards decorative art. Alexander Gerasimov (1884-) shows the influence of Monet and Pissarro. In the years immediately before the Second World War his speciality was portraiture; his largest work, completed in 1936, is the enormous picture 'The Founders of the First Cavalry Army.' In 1943 Gerasimov was given the distinction of People's Artist of the U.S.S.R. and to-day is one of the most favoured of Soviet painters.

Soviet painting, in the years following the Oct. Revolution, was chiefly represented by the 'Leftist' school, which was directly influenced by the post-Cézanne European style. The chief artists in this group are Konchalovsky, A. Lentulov, and I. Mashkov, whose Cubist or Futurist tendencies are strongly marked, though the neo-primitive tendency also had its adherents in such painters as N. Goncharov and M. Larionov. The traditions

Arkhipov, C. Meshkov, and Kasatkin. The period (1922-7) was marked by the formation of groups of painters seeking a new style, such as the Association of Russian Revolutionary Artists (A.R.R.A.) whose members depicted themes from the revolution and experimented in new methods of composition. Of these groups the leaders were Katzman, a founder of the A.R.R.A., a portrait painter and a psychologist of the realistic school, and I. Brodsky and S. Karpov. D. Kardovski contributed a whole series of well-executed illustrations portraying the hist. of the revolution; P. Kuznetsov took such subjects as the national rebirth and revolutionary struggle of the peoples of central Asia; while Sarian (see above), an Armenian painter, depicted the rebirth in his country. In the 1930s the greatest changes were taking place in monumental works of art rather than in individual painting. The artist Lanser decorated one of the Moscow railway stations with paintings illustrating the work of Soviet construction, while A. Deyneka (1900-) and F. Antonov painted frescoes in the Commissariat for Agriculture. Deyneka is a prolific painter with a most realistic outlook.

Stark realism characterises the work of Soviet war artists generally. Some of the best examples of this realism are Gaponenko's 'Slavholders,' Dormidentov's 'Flames over Leningrad,' and Shmarinov's 'We Shall Never Forget.' Vinogradov made eye-witness drawings of the battle for Stalingrad. Other painters include Korin (1902-) and Loukomey, both portrait painters, and Domogatsky and Bogayevsky, landscape painters. Typical of the style of the younger generation is the work of Rybchenko, as illustrated by his Moscow underground station and 'Palace of Soviets' interiors. Painters of the revolution and the civil war like Brodsky, Grekov, and Loubimov are numerous. In graphic art K. Roudakov is prominent among lithographers, and his book illustrations are everywhere popular. G. Vereisky, another illustrator, shows delicate draughtsmanship. Nivinsky was a famous Russian etcher, but his successors have not mastered his technique or developed one of their own of comparable merit. Although working mainly in France and Germany, the work of Marc Chagall, a Russian Jew (b. 1887 at Vitebsk), must be mentioned, since his subjects are taken from Russian life and folk-lore, but his fantasy is removed from the spirit of present Soviet art, which is marked by the 'Social realism' that deprecates aesthetic or imaginative flights. Some artists since the War have shown an oriental leaning, in subjects taken, e.g. from Uzbekistan or Samarkand, but this, too, is an interest in present life rather than an orientalism of style. See also RUSSIAN ARCHITECTURE.

Icon Painting. Icons (or ikons, from Gk *eikon*, image) paintings or mosaics of sacred personages, and themselves regarded as sacred, an art which in former cents. might be considered to be the

revolution: the most prominent are A.

characteristic expression of Russian religious thought and popular piety, became, in the later cents., the chief symbol of Russian faith. The art of the icon consists in the painting on panels of one or more pieces of wood glued together, the panel being smoothed with paste and primed with glue and chalk to receive the design either directly or, as often in the case of the more elaborate icons, through the medium of a kind of transfer used to ensure the right outlines. The early 11th- and 12th-cent. icons were essentially Byzantine in inspiration and limited in colour, whereas in the next 2 cents. brilliant colours are a quality of the icons of the Novgorod school, which gradually evolved an individual style. The art reached its zenith before the end of the 14th cent. in the work of Andrea Rubl'ev (c. 1370-c. 1430), and for a cent. or more his influence was predominant. The early 15th cent. witnessed the development of the elaborate *iconostasis* (of the E. Church) or screen separating sanctuary from the main body of the church, on which icons were placed. A new style in the art of icon was inaugurated by the Straganov school in the late 16th cent., the masters of which produced highly elaborate and meticulous icons, mostly miniatures, while the 17th cent. saw the decline of the art into mere virtuosity; and by the 18th cent. the art had degenerated into a mass-production monopoly in Vladimir. The ancient art still survives in some degree with its traditional methods and technique, but the expressiveness and quality of colouring characteristic of the works of the best periods have been lost.

Goldsmiths' and Silversmiths' Work. Russian goldsmiths' and silversmiths' work, as exemplified in museums or great private collections of pre-1918 times, or at the Brit. and Victoria and Albert Museums, is remarkable for splendour, richness of colour through polychrome enamelling, and liberal use of jewels. In the 17th cent. the work was typically Muscovite, but the 18th and 19th cents. showed a reversion to Fr. influences. Of all the decorative arts of R., that of enamelling is perhaps the most characteristic, as well as one of the most ancient. Greco-Scythian work found in the turmoil of S. R. affords evidence that Russian artificers were not exclusively dependent on Byzantine models, though there are many fine Byzantine specimens in Caucasia. The long Mongol domination of R. had a strong influence on the art of enamelling, as it had on all other arts, though at this time W. influences were also making themselves felt, and the finest of Russian enamels belong to this period. The Imperial orb, from the old Russian regalia, of the 17th cent., shows no traces of that barbaric feeling which is predominant in much Russian art. Peter Carl Fabergé (1846-1920) was the most renowned of Russian goldsmiths. The Imperial Easter Eggs and other pieces he produced for the Tsar, Tsarina, and members of the Court are among the most exquisite of all goldsmith's work.

Sculpture. The art of sculpture was never looked upon with favour in old-time Russia, since all graven or modelled images were taboo in the Orthodox Church as savouring of idolatry. It was not until the importation of Western ideas in the 18th cent. that there came about a spirit of toleration. The earliest notable Russian sculptor was Count Carlo Rastrelli (d. 1744), father of Rastrelli, the famous architect to Elizabeth Petrovna, whose best works include the well-known equestrian statue of Peter the Great at Leningrad and a bronze bust of that monarch in the Winter Palace. Other noted sculptors of this earlier period include Gillet, prof. of sculpture at the Academy of Fine Arts; Falconet (q.v.), a Fr. sculptor who became the art adviser of the Empress Catherine; and Gillet's best pupils, Shubin (d. 1805) and Kozlovski (d. 1802). As representatives of the classic period may be mentioned Shehedrin (d. 1825), a versatile sculptor of statues, monuments, and bas-reliefs, whose dynamic statue of Marsyas is in the Academy of Fine Arts (Leningrad), Gordiev, and Prokoviev. Count Theodore Tolstoy (d. 1873), a romanticist, and Ivan Vitall (d. 1855) are among the better known of those who exemplify the national spirit. Among sculptors of the 19th cent. whose works reveal a naturalistic vein are Kamenski, Antokolski (q.v.), and Troubetzkoi.

The main direction in Soviet sculpture since the revolution has been towards the creation of monumental works depicting episodes arising from the conflict between the Bolsheviks and the 'White' Russians. The most significant works of this time are the statue Karl Marx (1918) by Matveyev in Leningrad and the statue of Liberty in Moscow. Monuments for streets, squares, and parks are a somewhat crude edition of a kind of classical style which is devoid of either the beauty of the antique or the intellectuality of the Renaissance. Even women sculptors eschew the old ideals of grace and tenderness, as may be exemplified in the thick-set female figures wrought by Somotrova. Real grace and delicacy of line are found in statuettes, bronzes, or ceramics, and may be illustrated by the work of Kardashev and Matveyev. Schadr's colossal Lenin Memorial near Tiflis is said to be the greatest sculptural work of the Soviet age, and most of his work is characterised by simple realism. Other Soviet sculptors of these years, notable Chaikov, were influenced by Cubist constructivism. A. Archipenko (1887-) is one of the exponents of a plastic Cubism. Sarah Lebedev's portrait sculpture of revolutionary personalities is full of life and realistic beauty. Portrait heads by Tschalkov and Korolyov indicate, perhaps, that Soviet sculptors' talents lie rather in characterising personalities than in plastics generally. The semi-impressionist and later, academic, sculptor, N. Andreyev (d. 1932), sculptor of a series of portraits and statues of Lenin, had no rival in the portrayal of Lenin from life.

Frikh-Khar, one of the most original Soviet sculptors, is best known for his works representative of central Asia.

Film. In 1917 Lenin avowed that 'for us the most important of all the arts is the cinema,' and he and his successors valued the art not only for its entertainment value but also, and in fact primarily, as a vehicle for education and for the presentation of the Communist idea and achievements to R. and to the world. The industry was nationalised in 1919, and the State Institute of Cinematography

ciple of the film were consciously realised. As a result, the silent film reached its highest development in such works as Eisenstein's *The Strike*, 1924, *The Battleship Potemkin*, 1925, *October*, 1928, and *The General Line*, 1929, Pudovkin's *Mother*, 1926, *The End of St Petersburg*, 1927, and *Storm over Asia*, 1928, and Dovienki's *Earth*, 1930. The later history of the film everywhere was deeply influenced by the Russian contribution, particularly in the documentary type and in the use of imagery and association.



National Film Library

'THE ODESSA STEPS,' FROM EISENSTEIN'S 'THE BATTLESHIP POTESKIN'
Czarist soldiers attacking citizens of Odessa, Sept. 1905.

estab. for research and to train technicians. By 1937 there were 36,000 silent and 300 sound projectors to serve a pop. of 160,000,000. The industry is controlled by the Committee of Arts. Each republic has a studio, and there are institutes in Moscow and Leningrad and a school in Moscow. Distribution trusts in each republic control distribution and exhibition, save for the 5 largest Moscow cinemas, which are directly controlled by the Committee of Arts.

In the 1920s Vertov experimented in camera angles and Kuleshov in cutting. Theories of the film began to be closely studied, and particular attention was paid to the work of D. W. Griffith. His art of editing was greatly developed and its potentialities as the fundamental prin-

Pudovkin's *Film Technique* (Eng. trans. 1929, 1933) was one of the first studies of technique and aesthetics.

The introduction of sound was made only slowly, owing to contemporary economic difficulties and to the enormous number of silent projectors in use. A change of approach was also effected in the 1930s, the younger directors preferring realism to the older aestheticism, the new attitude being exemplified in the Vassiliev brothers' *Chapayev*, 1934-5, notable in its development of character with the aid of sound, and the realism which it achieved without being pedestrian. Eisenstein's aesthetic experiments would seem also to have been effected by the campaign against formalism current at the time, and his recent sound films are more static

than were his silent films. Important Russian sound films include *The Road to Life* (Elkk, 1931), *Storm* (V. Petrov, 1934), *The Baltic Deputy* (A. Zharkii, 1937), *The Maxim Gorki trilogy* (M. Donskoi, 1938-41), *Alexander Nevski* (Eisenstein, 1938), *Peter the Great* (V. Petrov, 1939), *General Suworov* (Pudovkin, 1941), *Othello* (Youtkevitch, 1955), and *Ivan the Terrible* (Eisenstein, 1944). Well-known directors, besides those mentioned, include Alexandrov, Ermier, Protasanov, Trauberg, Turin, Room, and Romm. Shostakovich and Prokofiev are among those in sev. countries who helped greatly to improve the standard of film music. In the introduction of stereoscopic films (see STEREOSCOPY) Russians played a pioneer role. See D. T. Rice, *Russian Art*, 1935; J. Chen, *Soviet Art and Artists*, 1944; C. G. E. Bunt, *Russian Art from Scythia to Soviets* (The Studio Ltd.), 1946; D. T. Rice, *Russian Icons*, 1947; T. T. Rice, *Russian Art*, 1949; T. Dickinson and Catherine de la Roche, *The Soviet Cinema*, 1948.

Russian Federal Republic, see RUSSIAN SOVIET FEDERATIVE SOCIALIST REPUBLIC.

Russian Front (First World War), Campaigns on. On the outbreak of the First World War the Russians occupied the E. front, and at once invaded E. Prussia, their line making a salient in Poland. Under the supreme command of Grand Duke Nicholas, they advanced along the Kovno-Posen railway and defeated the Germans on 16 Aug. 1914 at Gumbinnen, securing the junction at Insterberg and driving the remnant into Königsberg on the coast. The Ger. Gov., alarmed at this menace, called up Hindenburg (q.v.) from retirement; he was sent, with Ludendorff (q.v.) as his chief-of-staff, to stop the Russians. The study of the Prussian frontier in this region had been Hindenburg's sole occupation during his retirement. He rapidly collected an army and occupied a line at Tannenberg (q.v.), and between 26 and 31 Aug. signally defeated 2 Russian Army corps which he caught in a defile.

The S. portion of the Russian forces swung forward from victory to victory over the Austrians. Ruskys (q.v.) and Brussilov defeated them decisively in Aug. 1914 along the line of the R. Bug, and by the end of the month Brussilov had entered Galicia at Tarnopol. Pressing on, the Russians invested Przemyśl (q.v.) towards the end of Sept., and made for the passes across the Carpathians. The Germans made a counter-offensive across Poland in Oct. 1914, causing the S. portion of the Russian forces to withdraw beyond Przemyśl. When the Russians regained strength they attacked the Austro-Germans E. of the R. San and defeated them, driving them beyond the riv. They then moved against Cracow during the first week in Dec. 1914, but this move was successfully countered by the enemy, causing the Russians to withdraw behind the R. Dunajec (see DUNA-JEC-SAN, BATTLES OF).

The year 1915 opened with a battle for the Carpathian passes, but the Austrians

made no headway. Hindenburg made a determined effort to clear the Russians from Warsaw, in which he succeeded by Aug. Farther N. the Russians also withdrew in the Grodno region, and a Ger. advance towards Riga was also partly successful. In 1916 the Russians defeated the Austrians about Czernowitz, and gained ground between Dubno and Kovel during the summer. Towards the end of the year they made strenuous efforts to link up with the Rumanians, but these failed.

The Russian Revolution broke out in Mar. 1917, and though the Russian Army remained in the field for some months after that event, no operations of importance took place thereafter (see also GALICIA, CAMPAIGN IN; WORLD WAR, FIRST (under various sub-headings)).

Russian Language and Literature. *Language.* The Russian language is the most important speech of the Slavonic branch and belongs, with White Russian (see BELORUSSIA) and Ukrainian (see UKRAINE), to the E. group of the Slavonic sub-div. of the Balto-Slavonic branch of the Indo-European languages. Russian is the chief language of the U.S.S.R., and is spoken by the most numerous of the Slavonic peoples, the Great Russians (as distinguished from the Little Russians or Ukrainians, and the White Russians), numbering over 100,000,000. Russian is extraordinarily rich in grammatical forms: its noun still contains the locative and instrumental case-forms, which some Indo-European languages had eliminated 3 millennia ago; it possesses 3 genders (masc., fem., and neuter); there are 2 adjectival declensions, case and gender forms of numbers, and a great luxuriance of verb-forms. It is extremely rich in sounds, and its alphabet, known as Cyrillic, consists of 33 letters (see ALPHABET). The Russian alphabet is amongst the most complete systems of writing. It contained, however, too many letters, some of which became redundant. In its reform (17 Nov. 1918) some letters were dropped as their sounds were covered by other existing letters.

Literature. The conversion to Christianity marks the real beginnings of Russian literature, though some of the legends of medieval Russia have their basis in pagan mythology. This early literature consists of religious texts and legends or chronicles, and Russian folk literature until the 20th cent. continued to be founded on these early themes, the characters being altered in different regions and cents. so that the same plot might at varying times have as its central character Vladimir I, Ivan the Terrible, Peter the Great, etc. Russian folk literature was first systematically collected during the 19th cent., when its merit was first recognised. The *Bylina*, epic songs of popular Russian poetry, were not collected in bulk until the beginning of the 20th cent.

The most outstanding original literary works of the Kievan period (see KIEVAN RUSSIA) were the *vita* of St Theodosius,

c. 1080, the *Pilgrimage of Abbot Daniel to the Holy Land*, c. 1108, the *Original Chronicle*, c. 1116, the *Testament of Prince Vladimir Monomakh* (q.v.), d. 1125, and the famous *Word of the Campaign of Igor*, soon after 1185. The period of particularisation produced, among other notable works, the *Journey Beyond the Three Seas*, by the Tver' merchant A. Nikitin, who travelled to India 1466-72. The Muscovite period was richer in literature, but its greatest achievements were in the field of political journalism (the correspondence between Ivan the Terrible and Prince Kurbskiy) and autobiography (*The Archbishop Avvakum's Life Written by Himself*, 1672-3). In the late 17th cent. the Muscovite intellectual and literary life was greatly influenced by Ukrainian clerics from Kiev, who were acquainted with Medieval W. literature through their contact with Poles.

Modern Russian literature began in the 18th cent., when the Classicist school adopted the French classical standards (Prince A. Kantemir, 1708-44; V. K. Trediakovskiy, 1703-69; M. V. Lomonosov (q.v.); A. P. Sumarokov, 1718-77). The greatest and most original poet of the Classicist school was G. R. Derzhavin (q.v.), the most outstanding playwrights D. I. Fonvizin (1745-92), author of *The Minor*, and A. S. Griboyedov (q.v., 1798-1822). I. A. Krylov's (1769-1844) famous fables also belong to this school. Successive W. influences brought to Russia 2 new literary trends which partly overlapped with later Classicism. The Sentimental school was headed in Russia by N. M. Karamzin (q.v., 1766-1826), the Romantic by V. A. Zhukovskiy (q.v., 1783-1852). The 2 greatest Russian poets, A. S. Pushkin (1799-1837) and M. Yu. Lermontov (1815-41), were partly Romantics.

With Pushkin (q.v.) Russian literature emerged from its apprenticeship and achieved maturity. In his formative years Pushkin was influenced by all 3 contemporary schools, Classicist, Sentimental, and Romantic, and he freely acknowledged his indebtedness to Derzhavin, Karamzin, and Zhukovskiy, as well as to Voltaire and Byron. Romantic poems mark an important period in his creative development, but his highest achievements, both in verse (*Eugen Onegin*) and prose, initiated the new Realistic trend which was to become predominant in subsequent Russian literature. Pushkin, though he is comparatively little known or appreciated abroad, was undoubtedly the greatest Russian literary genius, and is universally considered in Russia as the symbol of Russian culture.

Pushkin inaugurated what came to be known as the Golden Age of Russian literature. His younger contemporaries, Lermontov and Gogol', had strong Romantic traits; Lermontov (q.v.), indeed, was probably the most truly Romantic of Russian poets, but both followed Pushkin in turning to Realism. Of the great writers of the period, only

the poet Tyutchev (q.v.) escaped this turn. With the advent of Realism, prose replaced poetry as the main form of literary expression. N. V. Gogol' (q.v., 1809-52) and S. T. Aksakov (q.v., 1791-1859) were prose writers. Their successors followed Gogol's path of Critical Realism, rather than Aksakov's sympathetic recollection of the life around him. With Critical Realists, the novel emerged as the principal genre, as it did in France and England. I. S. Turgenev (q.v., 1818-83) and I. A. Goncharov (q.v., 1814-91) were great novelists. Among the lesser ones, M. Ye. Saltykov-Shchedrin (see SALTYKOV) distinguished himself by the sharpness of his social and political satire. The dramatic genre was also highly suited to the requirements of Critical Realism: Gogol' and A. N. Ostrovskiy (q.v., 1823-86) were the most accomplished masters of this art. Critical Realism in fiction was strongly encouraged by both contemporary factions of literary critics and publicists—the Westernisers (q.v.) and the Slavophiles (q.v.). It was weakest in poetry, N. A. Nekrasov (q.v.) being the only outstanding poet of the school.

However, the sway of Critical Realism was not complete. At the time of its vogue its tenets were challenged by several writers of outstanding talent, and some of genius, who rebelled against its canons of stylistic austerity and the comparative narrowness of social criticism. But this was all that was common to them. Beyond this point each of the rebels went his own highly individual way, and each established a new tradition. N. S. Leskov (q.v., 1831-95) wrote incomparably rich language and concentrated on positive types in a strongly anti-Radical sense. L. N. Tolstoy (q.v., 1828-1910) transgressed the limits of social realism and, confronting his heroes not only with their environment but also with themselves, became the father of Psychological Realism. F. M. Dostoyevskiy (q.v., 1822-81) went still farther, facing man with spiritual realities and problems, and his art accordingly might be called Pneumatological Realism. Finally, A. A. Fet (q.v.) championed pure poetry in an - of prose and social utility of art. The writer who to some extent benefited from the new influences was A. P. Chekhov (q.v., 1860-1904), who combined in his work most of the traditions of the past.

On the eve of the new cent. the reaction against Critical Realism developed into a frontal attack from the modernist movement. The leading school here were the Symbolists, mostly poets, headed first by D. S. Merezhkovskiy (q.v., 1866-1941), then by A. Blok (q.v., 1880-1921). One of the leading Symbolists, A. Bely (q.v., 1880-1934), following to some extent Leskov's example, began experimenting with the prose style. Critical Realism staged a come-back during and after the revolution of 1905 (q.v.) under the leadership of M. Gor'kiy (q.v., 1868-1934), who had at

first captured the imagination of the reading public as a neo-Romantic rebel (see also ANDREYEV; BUNIN). The popularity of this rather naturalistic school was short-lived, and already before the First World War it was beginning to give way to another trend, the Neo-Realists (see A. N. TOLSTOY, PRISHVIN), who combined realistic content with the stylistic innovations of A. Bely and their own leader, A. Remizov (1877-1957). In poetry the Symbolists were soon confronted with two new and hostile trends, the Acmeists led by N. Gumil'ev (1886-1921, shot by the Bolsheviks) and his wife A. Akhmatova (1888-), and the Futurists, the most outstanding of whom was V. Mayakovsky (q.v., 1893-1930).

Such was the literary scene at the time of the 1917 revolution and the seizure of power by the Bolsheviks (see COMMUNIST PARTY OF THE SOVIET UNION). During the civil war (see CIVIL WAR, RUSSIAN; WAR COMMUNISM) that followed many writers emigrated (Gor'kiy, Bunin, Andreyev, Merezhkovsky, A. Tolstoy, Ehrenburg, etc.). In Russia the literary life was dominated by the Futurists, the young proletarian poets of the Proletcult (q.v.), both groups competing for recognition as true representatives of the new regime in literature, and by the purely propagandistic poetry of D. Bednyy (q.v.). The period of the N.E.P. (q.v.) brought considerable relaxation of the regime, the revival of the old groups, and the appearance of several new ones. Open critics of the regime continued to be silenced as before, while the rest of the writers were loosely divided into 'proletarian writers' holding Communist views, and 'fellow-travellers' (q.v.) who sympathised with the revolution for other reasons. Both were split into various warring associations based on ideological or artistic principles. The most outstanding among the 'fellow-travellers' were B. Pilnyak (1894-1937), I. Babel, L. M. Leonov (q.v., 1899-), Yu. Olesha (1899-), the 'Serapion Brothers' group (including K. A. Fedin, V. A. Kaverin, M. Zoshchenko—q.v.), the followers of Zamyatin and Neo-Realism, and the peasant poet S. Yessenin (q.v., 1895-1925). A. A. Fadeyev (q.v., 1901-56) and M. A. Sholokhov (q.v., 1905-) were the most talented and productive of the 'proletarian writers.' Whereas poetry was characteristic of the civil war years, prose was now again predominant, and has remained so since. The novel was once more the main genre. Fadeyev and Sholokhov revived Tolstoy's Psychological Realism, while Leonov revived the Dostoyevskian tradition.

During Stalin's 'revolution from above' of the first Five Year Plan (see FIVE YEAR PLANS) and the Collectivisation of Agriculture (q.v.), the Association of Proletarian Writers assumed a quasi-dictatorial position in the literary field, but in 1932 it was abolished together with all the other associations by party decree, and a single Union of Soviet Writers established whose members were soon

committed to the official conformity of Socialist Realism (q.v.). Gor'kiy, who had returned from abroad, was proclaimed a model of this method, while A. A. Zhdanov exercised the overall party supervision over literature as in other ideological matters.

The atmosphere was somewhat relaxed during the Second World War, but in 1948 Zhdanov's rule was re-established in an even more severe form, rendering the years 1946-53 practically sterile—what went for literature consisted of lifeless idealisation of the Communist regime, idolisation of Stalin, and wild xenophobia. Only after Stalin's death did a 'thaw' occur, and since then a lively artistic and political opposition has developed among the writers. The oppositionists reject the principle of party direction and have revived Critical Realism, as well as genuine lyric and political poetry. The most prominent among them are B. L. Pasternak (q.v., 1890-) and Kaverin of the older generation, A. T. Tvardovsky (q.v., 1910-), Dudintsev (q.v., 1919-), and Ye. Yevtushenko (1933-).

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Russian Music. Apart from the traditional music of the Gk Church and a very rich and varied folk art, Russia made no significant contribution to music before the 19th cent. It. opera had been introduced by the court, and during the reign of Catherine II (1762-94), herself the author of librettos, Galuppi, Paisiello, Cimarosa, and other Italians produced operas in Russia by invitation, and another Italian, Cavos, settled permanently in Russia. Bortniansky (1752-1825), a pupil of Galuppi, wrote choral music for the Imperial Chapel at St Petersburg. The Napoleonic invasion of 1812 was followed by a great artistic revival, led by the poet and dramatist Pushkin; in Russia the connection between music and letters has always been close. The first Russian composer of distinction was Glinka (1804-57), whose operas *A Life for the Tsar*, 1836, and *Russian and Ludmila*, 1842, are landmarks; their compound of It. convention with the vital strength of native folk music, though not satisfactory as an artistic whole, is the central root of later R. M. This conscious nationalism was extended by Dargomizhsky (1813-69), whose operas abandoned melody and pursued natural speech rhythms and dramatic truth, and by the St Petersburg group known as the Five:

Balakirev (1837-1910), **Cui** (1835-1918), **Borodin** (1833-87), **Rimsky-Korsakov** (1844-1908), and **Mussorgsky** (1839-81). None of these was a professional composer by training. The leader and mentor of the group was Balakirev, who was remarkable as much for his influence on the others as for the great harmonic originality and colour of his instrumental works. In 1862 he founded the Free School of Music at St Petersburg in opposition to the conventional teaching of the official conservatories under the brothers Rubinstein. Cui, a gen. of engineers, served the cause more efficiently in journalism than in his music, which is negligible. Borodin, a prof. of chem., wrote little, but nearly all of it, especially his symphonies and quartets, is of the highest quality and individuality. His unfinished opera *Prince Igor* has an epic grandeur. He was a great melodist, and the dark colouring and rich harmony of his music reflect his oriental ancestry (his father was a Georgian prince). Rimsky-Korsakov wrote the first Russian symphony as a midshipman on a naval cruise. His 15 operas, mostly based on folk tales, show a stronger gift for fantasy than for characterisation; his orchestral works are marked by great virtuosity; he was also important as a teacher. Of the Five, Mussorgsky had most genius and least training. Intemperate habits led to his early death, and few of his major works were finished, but his opera *Boris Godunov*, 1874, is a national epic of great dramatic power and has deeply influenced modern music. Until recent years it was known only in Rimsky-Korsakov's version, which bowdlerised the harmony and orchestration. Mussorgsky was also a remarkable song-writer, re-creating the speech rhythms of the Russian peasant in a style at once realistic and artistic.

The leading composer in Moscow was **Tchaikovsky** (1840-93), whose style, though not without a national strain, was more influenced by the cosmopolitan W. tradition. A strongly emotional and subjective element in his symphonies has won him friends and enemies in large numbers. He used nearly all the traditional forms; probably his operas, especially *Eugene Onegin*, 1879, and his brilliantly scored and melodious ballets represent him at his best. His successors **Taneiev** (1856-1915), **Arensky** (1861-1900), and **Rakhmaninov** (1873-1943) followed the cosmopolitan line; the last was a gifted writer for the piano. **Glazunov** (1865-1936), originally a follower of the St Petersburg nationalists, wrote symphonies and chamber music in the traditional idiom. A more eccentric course was steered by **Scriabin** (1872-1915), who passed through Chopinque romanticism to a mysticism based on theosophy, under the influence of which he aimed at a synthesis of all the arts, not omitting colour and smell. Early in the 20th cent. Russian national opera and ballet achieved worldwide fame and influence through the activities of the impresario **Diaghilev**, who produced *Boris Godunov*

in Paris in 1908; but the creative tradition was shattered by the revolution of 1917. Many estab. composers took refuge in exile, including **Rachmaninov**, **Glazunov**, **Medtner** (1880-1951), who wrote mostly for the piano in a strongly individual style, and **Stravinsky** (1882-), a pupil of Rimsky-Korsakov. Stravinsky's early ballets, remarkable for their barbaric power and ceaseless experiments in rhythm, colour, and orchestration, have a strongly Russian flavour; his later work, written in Paris or the U.S.A., preserves the constant search for novelty, but is cosmopolitan, neo-classical, and anti-romantic. **Prokofiev** (1891-1953), a prolific composer of more vivacity than weight, was for some years in exile, but returned to Russia in 1934. The music of the Soviet era has been disappointing. Popular art has naturally been encouraged, and valuable work has been done in the collection of folk music from the many races of the Union; but the exercise of political pressure on composers to gratify the popular taste (in effect the taste of the Communist party leaders) has led to a decline of standards, especially as it has been accompanied by an *ex parte* rejection of all modern W. music and a disingenuous manipulation of ideological jargon. Seldom has the bankruptcy of applying external standards to art been more convincingly proved. **Shostakovich** (1906-), whose first Symphony (1925) showed great promise and originality, has more than once been censured by the authorities for such crimes as 'anti-people formalism,' but his talent proved strong enough to mature independently. Similar strictures have (1948) been passed on **Prokofiev**, **Miaskovsky** (1881-1950), a prolific composer of symphonies, the Armenian **Khachaturian** (b. 1903), whose work has a strong folk element, and others. See N. A. Rimsky-Korsakov, *My Musical Life* (Eng. trans.), 1923, 1942; G. Abraham, *Studies in Russian Music*, 1935; M. D. Calvocoressi and G. Abraham, *Masters of Russian Music*, 1936; R. Molsenko, *Realist Music*, 1949; A. Werth, *Musical Upstart in Moscow*, 1949.

Russian Social Democratic Labour Party, Russian political party founded in 1898. The first small underground Social Democratic groups had been set up in Russia in the late 1870's. The 'Liberation of Labour' Group (q.v.) and sov. organisations for the propagation of Marxism among industrial workers were formed mostly by former Populists (see POPULISM) during the 1880's and early nineties. From 1894 or 1895 many of them engaged in agitation aimed at fomenting economic struggle by the workers. The R.S.D.L.P. united orthodox Marxists and revisionists (see LEGAL MARXISTS), trade unionists (see ECONOMICISM) and more politically minded people, but almost immediately the latter, led by Lenin, set out to capture the party (see ISKRA). At its second congress in 1903 the party split into Bolsheviks (see BOL-SHEVISM) and Mensheviks (q.v.), and

although it was formally reunited 1906-12, in fact both factions continued to exist, further splitting up after the revolution of 1905 (q.v.) into sev. sub-factions. The Bolsheviks finally abandoned the name R.S.D.L.P. in 1919, while the Mensheviks retained it. See also BOGDANOV; BUND; LENIN; MARTOV; PLEKHANOV; POTREBOV.

Russian Soviet Federative Socialist Republic (abbreviated R.S.F.S.R.), official name of the largest, most populous, and economically most important constituent rep. of the U.S.S.R. (q.v.). It comprises most of the ter. with predominantly Great Russian (q.v.) pop.—the larger part of European Russia, Siberia (q.v.), and the Far E. (see FAR EAST, RUSSIAN). For geography, see RUSSIA. The name R.S.F.S.R., adopted in 1918, is misleading, since its administrative structure is not federal (even formally) but centralised. Its 14 autonomous reps. take up only about a quarter of its ter., the rest consisting of ordinary administrative units—*oblasts* and *krais* (see OBLAST; KRAY). In many respects the R.S.F.S.R. is less of a separate entity than the smaller constituent reps., its institutions being identical with those of the U.S.S.R. or overshadowed by the latter. It has, for example, no separate Communist party organisation (see COMMUNIST PARTY OF THE SOVIET UNION). However, since Stalin's death its identity has become somewhat more pronounced. Area 6,670,400 sq. m., or nearly three-quarters; pop. (1956) 112,600,000, or 56 per cent of the U.S.S.R. total. See E. H. Carr, *The Bolshevik Revolution* (vol. 1), 1950.

Russian Wolfhound, see BORZOI.

Rusky, Nicolai (1854-1918), Russian soldier, b. Kiev and studied at the staff college, St Petersburg. He was made a gen. in 1896. At the beginning of the First World War, R. was one of 3 gens. entrusted with the SW. front. When the Austrians broke through near Lublin, R., with Brusilov, moved quickly into Galicia, and threatened the Austrian rear. R. entered Lvov on 3 Sept. 1914 and defeated the retiring Austrians at Rawa Ruska. When Hindenburg, near Łódź, threatened to break through in Nov. and Dec., R., now appointed to command the W. front, reversed the position. R. is believed to have been killed by Bolsheviks some time in 1918.

Russo-German Campaigns in Second World War, see EASTERN FRONT.

Russo-Japanese War (1904-5). The essential cause of this war lies in the conflicting interests of Russia and Japan on the mainland of Asia. Russia, in her endeavour to become a great Pacific naval power, sought a port in the Far E. which would be free from ice all the year round and which would form a good naval base. In 1896 she secured a lease of Port Arthur from China, and connected this port with St Petersburg by means of the Trans-Siberian railway. She also sought to transform Daini (Dairen) into a great Asiatic port. In 1900 Russia extended her power over the Chinese prov. of Amur,

and sought the recognition of her suzerainty over the country. Opposed by both Japan and Britain, she finally agreed to evacuate the whole of the ter. which she had fished from China. Beyond withdrawing her troops from S. Manchuria and Mukden, she failed signally to carry out the terms of the agreement. Finally, in 1903, a proposal emanating from Japan, and suggesting that the integrity of China and Korea should be vouched for by the contracting parties, at the same time proposing that Russian interests in Manchuria and Jap. interests in Korea should also be safeguarded, was refused by an optimistic and short-sighted Russian Gov. Japan withdrew her minister from St Petersburg (26 Jan. 1904), and within 2 days had landed troops at Chemulpo, and a day later defeated the Russian fleet at Port Arthur. Adm. Togo inflicted heavy loss on a Russian fleet under Makharov in Apne. Meanwhile a second Jap. army under Oku had landed on the Liaotung peninsula and had won many victories. The railway communication between the Russian Army and Port Arthur was severed, Kinchau was captured, and after the victory at Nanshan, Daini was occupied by the Japanese and made a new base of operations. The Russians were forced back until finally, after 3 days' fighting, Limun-tun fell into the hands of the Japanese. The defeat cost the Russians nearly 15,000 men. The main result of the 15 days' almost continual fighting, which had started on 9 Sept., was the loss to the Russians of over 50,000 men. The investment of Port Arthur by the Japanese had in the meantime begun. After strenuous fighting, each step being keenly contested, the main vantage points had been captured by the Japanese. On 10 Aug. a naval sortie took place, but was defeated, broken up, and driven back, and the Vladivostok fleet, coming to the aid of the Russians at Port Arthur, was also badly defeated. On 23 Nov. Metre Hill was captured, and the in and harbour lay at the mercy of the big Jap. guns. By the end of the year the chief fortresses were in the hands of the Japanese, and on 2 Jan. Port Arthur surrendered, and on 10 Mar. Mukden was occupied by the Japanese. In Oct. 1904 the Russian Baltic fleet had sailed for the Far E. It caused a diplomatic incident by firing on the Hull trawlers, believing them to be Jap. warships. It was surrounded on 27 May by the Jap. fleet in the straits of Tsushima and practically annihilated; 4000 men were killed, nearly 8000 captured, and almost the whole fleet was sunk. This was the decisive battle of the war. In Aug. terms of peace were arranged at Portsmouth, U.S.A., and the Russians received not unfavourable terms. Russian rights in Port Arthur and Daini passed to the Japanese; Sakhalin was divided between the opposing countries; no indemnity was to be paid by Russia, the Manchurian railway became the property of Japan, Korea became a Jap. sphere of influence, Manchuria was

evacuated by both armies and restored to China, whilst valuable fishing rights in the Bering Sea were ceded to Japan. Japan lost roughly about 170,000 men, whilst the war cost Russia about 400,000. See C. A. Court-Repington (*The Times* correspondent), *War in the Far East*, 1904-5; K. I. Asakawa, *Russo-Japanese Conflict*, 1905; I. Hamilton, *Staff Officer's Scrap-book*, 1905; A. N. Priboy, *Tsu-shima*, 1936.

Rust, see CORROSION OF METALS.

Rust Fungi (*Uredinales*), large and important order of Fungi, comprising about 4800 species, all of which are obligate parasites of seed plants and ferns. The name rust refers to the appearance of the summer spores (uredospores), which are formed in tremendous numbers on the leaves or stems of the host. The R. F. are allied to the *Ustilaginales* (Smuts), and are included with them in the group of Fungi known as Basidiomycetes, which also contains the common mushroom and the 'toadstools.' Many R. F. are *heteroecious*, i.e. they alternate between 2 different host plants, as, for instance, *Puccinia graminis*, the black rust of wheat, which occurs also on the barberry (*Berberis vulgaris*). This particular species is said to cause a reduction in the wheat crop of N. America and Australia of up to 50 per cent. See also SMUT. See F. T. Brooks, *Plant Diseases*, 1928.

Rustavi, tn in Georgia (Transcaucasia), 30 m. SE. of Tbilisi. It is a centre of the iron and steel industry in Transcaucasia. It was founded in 1948 in connection with the building of the metallurgical plant (1941-50).

Rustchuk, see RUSS.

Rustenburg, tn of the Transvaal, 60 m. by rail from Pretoria, half encircled by the Magaliesberg Mts. Centre of a tobacco-growing and agric. dist. Platinum, nickel, and chrome are mined in the vicinity. Pop. (Whites) 7230; (Bantu) 6260; (others) 664.

Rustication, or **Rusticated Work**, in Rom. and Renaissance architecture, a method of working external blocks of stone to produce an effect of massive strength, especially at the base of buildings. Normally this was done by a hammer, producing a rough surface, though the margins of each block were often chiselled smooth; but the term then came to be applied absurdly to smooth blocks which had carefully recessed margins, accentuating the joints.

Rustless Steel, see NICKEL.

Rutaceae, family of 100 genera, chiefly shrubs and trees of S. Africa and Australia, with alternate or opposite leaves, flowers usually in cymes, 5 or 4 sepals, 5 or 4 petals, 10 or 8 stamens, ovary superior, and fruits various. Important genera are *Aegle*, *Agathosma*, *Barosma*, *Boronia*, *Choisya*, *Citrus*, *Diosma*, *Erodia*, *Poncirus*, *Ptelea*, *Ruta*, *Skinimia*, *Spiranthera*, *Wendlandia*, and *Xanthoxylum*.

Rutebeuf, or **Rustebeuf** (c. 1230-80), Fr. poet; he and Jean de Meung were the greatest satirists of their time. His best works are short lyrical and mystical poems

and satires, but he was exceedingly versatile and tried almost every form of poetry and prose. He is the oldest representative of personal poetry in Fr. literature. Amongst his works are *Notre Dame*, *Grièche d'été et d'hiver*, *La Voie de Paradis*, and *Prrière de Rutebeuf*. See U. Lco, *Studien zu Rutebeuf*, 1922.

Ruth, George Herman (Babe) (1895-1948), Amer. baseball player, b. Baltimore and educ. at St Mary's Industrial School there. In 1914 he joined the Baltimore Orioles as a pitcher and outfielder. He later proved himself an outstanding left-handed pitcher with the Boston Red Sox. From 1920 to 1935 he played as an outfielder with the New York Yankees, retiring from baseball in 1935. R. starred in 10 world series games, held 54 major league records, including 60 home runs in one season (1927), 714 in the course of his career, and more than 40 for each of 11 seasons.

Ruth, the second of 5 of the 'Megilloth' or Festal 'Rolls.' An anonymous work of great beauty, giving an exquisite picture of the life of the time it depicts, it belongs evidently to the period in which Heb. literature was at its best. The story belongs to the time of the Judges. The central figure is Ruth, a Moabitess, who by a Levirate marriage became the great-grandmother of King David and an ancestress of Christ. In the Jewish canon it is placed between the Song of Songs and the Lamentations, and in the Jewish ritual it is read on the Feast of Weeks or Pentecost.

Ruthenia, latinised form of the name 'Russia,' sometimes used to denote an area of Central Europe inhabited by those Ukrainians who by religion are Catholics of the Eastern Rite (Uniate). It comprises Galicia (q.v.), N. Bukovina (see BUKOVINA; CHERNOVTSY), and Transcarpathia, (q.v.). The last particularly is often called R.

Ruthenium (symbol Ru, atomic weight 101.7), metallic chemical element. It is found in platinum ore, and is usually obtained from the residues left when osmium is separated from osmiridium. It is a grey metal resembling platinum, has a sp. gr. of 12, fuses in the electric arc, and has the power of absorbing gases.

Rutherford, Daniel (1749-1819), scientist, b. Edinburgh. He studied medicine at Edinburgh Univ. In 1772 he estab. the distinction between nitrogen (although he did not give it this name) and carbonic acid gas. R. later discovered the presence of nitrogen in air. Subsequent study on the constitution of natural gases was founded on his work.

Rutherford, Mark, see WHITE, WILLIAM HALE.

Rutherford, Samuel (c. 1600-61), divine, b. Nisbet, Roxburghshire. He graduated at Edinburgh Univ. in 1621, and was in 1623 appointed regent of humanity, but was deprived of his office in 1626, and became pastor of Anwoth, Galloway. In 1636 he pub. a treatise against Arminianism, for which he was summoned before the High Commission at Edinburgh

and forbidden to exercise his ministry; but he returned to Anwoth in 1838, and was made prof. of divinity at St Mary's College, St Andrews, the same year. He was one of the commissioners of the Church of Scotland to the Westminster Assembly (1843), and in 1851 was appointed rector of the univ. of St Andrews. He joined those who condemned the treaty with Charles II as sinful, and was deprived of his offices. His reputation rests chiefly upon his *Letters*, first pub. in 1864. See lives by A. Thompson, 1884, and R. Gilmour, 1904.

Rutherford of Nelson, New Zealand, Ernest Rutherford, first Baron (1871-1937), b. Brightwater, New Zealand, and educ. at Nelson College and Canterbury College, Christchurch, and later at Trinity College, Cambridge, where he did research work under J. J. Thomson at the Cavendish Laboratory. For a short period he continued the work on Hertzian waves which he had started in New Zealand. He did not continue his researches on wireless waves, having no interest in its commercial side, and was soon immersed in the new research which was destined to open up enormous fields in which he afterwards attained world-wide renown. His work on the radio-

gener's scintillation method. In collaboration with Roys, R. showed that alpha-particles on which the positive charge had been neutralised were helium atoms. Soon afterwards he determined the number of alpha-particles in unit volume of gas, and the result, 2.75×10^{18} atoms per c.c., conformed to Avogadro's Law and provided a direct proof of the discrete nature of matter. R. took a prominent part during the First World War in organising research on underwater acoustics to combat the submarine menace, but by the middle of 1917, when practical methods were proving successful, he resumed his work on nuclear physics, attacking by new methods the problem of alpha-particle scattering. In 1919 he was elected Cavendish prof. of experimental physics in the univ. of Cambridge, and during the period 1925-30 great improvements were made by his colleagues in experimental technique. The harvest of such improvements was reaped in later years, and 1932 has been truly described as the commencement of a new era in nuclear physics. In that year the disintegration of the nuclei of atoms was accomplished for the first time by means of charged particles, which were accelerated by using high voltages in vacuum tubes. In addition, the properties of the neutron which it had predicted some 12 years previously were studied. R. died suddenly, and his ashes were placed in Westminster Abbey, near the remains of Newton, Kelvin, Darwin, and Sir John Herschel.

Among the many honours conferred on him were: 1908, Brossa premium of the Academy of Science, Turin, and in the same year the Nobel prize for chem.; 1914, Knight Bachelor; president of the Brit. Association for the 1923 meeting; 1925, member of the Order of Merit; 1927-30, president of the Royal Society, to which he was elected Fellow in 1902 and which afterwards awarded him the Copley medal for his work on radio-activity; 1930, chairman of the Advisory Council of the Department of Scientific and Industrial Research; 1931, created a peer; 1935, director of the Royal Society Mond Laboratory. He was the recipient of a number of honorary degrees from various univs., and in addition to a large number of papers which appeared in different scientific pubs., he was the author of *Radioactivity*, 1904, *Radioactive Transformations*, 1906, *Radioactive Substances and their Radiations*, 1912, and *The Newer Alchemy*, 1937. See A. S. Eve, *Rutherford: Being the Life and Letters of the Late Rt Hon. Lord Rutherford*, 1939; I. B. N. Evans, *Man of Power: the Life Story of Baron Rutherford of Nelson, O.M.*, F.R.S., 1939; and N. Feather, *Lord Rutherford*, 1940.

Rutherglen, royal and municipal burgh of Lanarkshire, Scotland, situated near the Clyde, 2½ m. SE. of Glasgow. It is the oldest royal burgh in Scotland, having received its first royal charter in 1126. In the Middle Ages it was a town of considerable importance, but with the rise of Glasgow



LORD RUTHERFORD

A medal by T. Spicer-Simson.

activity of uranium was developing along very interesting lines when he was offered and accepted in 1898 the professorship of physics at McGill Univ., Montreal. During his 9 years there he carried out his great work on radio-activity and the alpha-particle, and the subject of radio-activity took on an enhanced interest after R. had shown the corpuscular nature of the alpha-radiation. In 1907 he was appointed prof. of physics at Manchester Univ., where he developed the electrical method for counting alpha-particles (see GEIGER-MUELLER COUNTER), which gave good agreement with Re-

it declined. It is now, however, a thriving industrial community. Ship-building and coal mining were formerly the prin. activities, but they have been replaced by the important industries, including iron, chemicals, paper, ropes, furnishing machinery. A minor industry is the making of oat-cakes. It was burnt down in 1568. R. forms part of a co. constituency. Pop. 25,000.

Ruthin, or Rhuthyn, municipal bor. and mrkt tn of Denbighshire, N. Wales, 21 m. from Chester. The 'Red Castle,' from which it takes its name, was built about 1280; the present structure was erected in the 19th cent. on the same site. Pop. 4000.

Ruthven, Baron, Scottish title borne by the family of Hore-R. The first creation of the title was in 1487, when Sir Wm R. was made a lord of Parliament. Wm, 4th lord, who was made Earl of Gowrie in 1581, was responsible for the seizure of the boy king, James VI (see RUTHVEN, RAID OF). For a short time he ruled the land in the young king's name, but after the latter's release he was executed (1584) for treason. The title then became extinct, but in 1651 it was granted to Sir Thomas R., from whom the present holder, Walter Patrick Hore-R. (b. 1870), 9th Scottish baron R. and 2nd U.K. baron R. of Gowrie, is descended.

Ruthven, Raid of, Scottish conspiracy which took place in Aug. 1582. The Earls of Gowrie and Mar, Lord Lyndsay of the Byres, and the master of Glamis seized the boy king, James VI, and took him out of the keeping of his guardians, the Duke of Lennox and the Earl of Arran.

Ruthvenfield, see HUNTINGTOWER.

Ruthwell, vil. of Dumfriesshire, Scotland, 10 m. SE. of Dumfries, noted for its famous 7th-cent. runic cross, which now stands in the par. church. It is 18 ft 1 in. high, but stands in a 9-in. socket, and is decorated with carvings of scenes from the life of Christ and verses in runic characters from the contemporary poem *The Dream of the Rood*, and with Biblical quotations in Latin. The first savings bank was opened in the vil. by the Rev. Henry Duncan in 1810: the Savings Bank House is open to visitors. Pop. 700.

Rutile, mineral consisting of titanium dioxide (TiO₂), generally impure. It crystallises in the tetragonal system, and twinning phenomena are frequent. The crystals range in colour from yellow to reddish-brown, and in sp. gr. from 4.2 to 5.2, according to the amount of ferric oxide present; hardness 6½. R. is found enclosed in schistose rocks, and in clays and slates in the form of fine needles. It is used to produce a yellow colour in glass and porcelain.

Rutilius Namatianus, Claudius (5th cent. AD) Lat. poet. His poem *De Reditu* describes his return to his native Gaul after a sojourn of considerable length in Rome, and is superior to the general productions of his age in purity of language and poetical colouring. Text and trans. by J. W. and A. M. Duff in *Minor Latin Poets* (Loeb. Library, 1934).

Rutland, Duke of, see MANNERS, JOHN. Rutland, Dukes of, Eng. title borne by the family of Manners. Richard Plantagenet, Duke of York, who was slain in 1461, was Earl of Rutland, and through his daughter he was ancestor of Thomas Manners, who was made Earl of R., 1525, being granted estates in Leicestershire. A later earl married Dorothy Vernon and obtained estates in Derbyshire. John, 9th earl, was made Duke of R. in 1703 as a reward for his loyalty to Queen Anne. Charles, 4th duke, was lord-lieutenant of Ireland under Pitt. The 10th duke (b. 1919), Charles John Robert Manners, succeeded to the title in 1940. The duke's eldest son is called the marquess of Granby. The duke's seats are Belvoir Castle, Leicestershire, and Haddon Hall, Derbyshire.

Rutland, midland co. of England, bounded N. and E. by Lincs, N. and W. by Leicestershire, and SE. by Northants. The surface is broken by low hills forming valleys, of which the chief is the vale of Catmose. Between Oakham, the co. tn. and Uppingham the co. was at one time covered by Lyfield or Leafeld Forest, part of which was Beaumont Chase. The prin. rivs. are the Welland, Gwash, Chater, and Eye. Almost the whole co. is under cultivation, wheat forming the main crop, and sugar beet, turnips, and swedes being also grown. Numbers of sheep and cattle are reared, and cheese is manufactured and known as Stilton. Limestone is quarried and ironstone is also worked. The co. contains 5 hundreds and along with S. Kesteven returns 1 member to Parliament. Area 150 sq. m.—the smallest co. in England, except London. Pop. 22,800. See Victoria County History, *Rutland*, 1908; A. Mee, *Leicestershire with Rutland*, 1942.

Rutland, city, co. seat of R. co., Vermont, U.S.A., 53 m. N. of Bennington. R. is the centre of an agric. dist., and is a railroad centre. It has marble quarries, a marble-shipping industry, and a marble-monument works. Its industries include scales, machinery, tools, metal products, lumber, cement products, clothing, printing, and food processing. It has a junior college. Pop. 17,659.

Rutland Isle, see ANDAMAN ISLANDS.

Rüttel see GRÖBL.

Ruvo di Puglia, It. tn. in Apulia (q.v.), 20 m. W. of Bari (q.v.). It has a fine 13th-cent. cathedral, and has been known since ant times for its pottery. Pop. (com.) 26,000.

Ruwenzori, range of mts of Uganda, between Lakes Albert and Edward. It was discovered by Stanley (1887-9), and has a length of 65 m., with a breadth of about 30 m. The highest point is Mt Stanley (Margherita) (16,794 ft). The climate is very damp, and the ann. rainfall about 180 in. The vegetation varies with the zones, which are well marked, but owing to the amount of moisture, mosses and lichens occur in sev. of the zones.

Ruysbroeck, Wilhelm (Rubruquis, Guillaume de) (c. 1220-c. 1294), Flem.

medieval traveller and missionary, b. Brabant. He entered the Franciscan order, and was sent to the Holy Land on a mission. In 1253 St Louis IX of France sent R. and 2 other friars on an embassy to the Mongol prince, Sartak, and to the Mongol emperor, Mangu Khan. The return journey was made by way of Caucasus and Syria to Tripoli in N. Africa. R. wrote an account of his travels in Latin. See H. Herbst and others, *Der Bericht des Franziskaners Wilhelm Ruysbroeck*, 1934.

Ruysbroek, Jan van (1293-1381), Dutch mystic, b. Ruysbroek, near Brussels. He was educ. in Brussels, and became priest in the church of St Gudule in 1317. In 1343 he retired to the solitude of the forest of Solignee, and 6 years later built a monastery there. His works, written in Flemish, were trans. into Latin by Surius c. 1545. Though severely criticised by Gerson, they had a profound influence upon all later mystical writers. The latest complete ed. is that of J. B. Poulkens and others, 1932, 2nd ed. 1944. There are Eng. trans. of *The Adornment of the Spiritual Marriage*, *The Sparkling Stone*, and *The Book of Supreme Truth* by G. A. Wynschenck (1916), and *The Kingdom of the Lovers of God* by T. Arnold Hyde (1919). See V. Scully, *A short account of the Life and Writings of Blessed John Ruysbroek*, 1910; A. Combes, *Essai sur la critique de Ruysbroek par Gerson*, 1945.

Ruydael, or Ruisdael, Jakob van (c. 1628-82), a great Dutch landscape painter, b. Haarlem. He studied surgery, but, on Berchem's advice, took up painting. His favourite subjects were woodland scenes, and he is especially famous as a painter of trees, but he also excelled in coast scenes and sea pieces, as well as in painting cloudy skies. Typical works are in the National Gallery.

Ruyter, Michael Adriaanszoon, see DE RUYTER.

Ruzicka, Leopold (1887-), Swiss chemist of Czech origin, b. Vukovar. He studied at the technical high school at Karlsbad. He held chairs of organic chem. at Utrecht and Zürich. His greatest work was his research on polymethylenes and the higher terpene compounds. In 1939 he was awarded, with Butenandt, the Nobel prize for chem.

Ryan, Loch, bay in N. Wigtownshire, Scotland, between 9 and 10 m. long and c. 2 m. wide, forming an excellent harbour. At its head is the port of Stranraer.

Ryazan': 1. Oblast in Central Russia, SE. of Moscow. It occupies parts of Meshehera (q.v.) in the N. and the Oka-Don lowland in the S., and is partly covered with mixed forests. Area 15,250 sq. m.; pop. (1956) 1,412,000, Russians and Tatars. There is grain and potato growing, horticulture, and dairy farming; food, light, and metalworking industries are found there. The prin. towns are R. and Kasimov. It formed part of the medieval Chernigov and Murom-R. principalities, was independent from the middle of the 12th cent., and was absorbed by Muscovy in 1521.

2. (until 1778 Pereyaslavl'-Ryazan-skiv) Cap., economic and cultural centre of the above, on R. Oka. There are engineering, food, and light industries. It has many 14th-19th-cent. architectural monuments. Pop. (1956) 136,000 (1897, 46,000; 1920, 41,000). R. has been known since 1095 and was cap. of R. principality from the early 14th cent. until 1521.

Rybinsk, see SHCHERBAKOV.

Rybinsk Reservoir, artificial reservoir in Central Russia, created by a dam on the Volga above Shcherbakov, and bordering on Kalinin, Vologda, and Yaroslavl Oblasts. Length from NW. to SE. 60 m., width 25 m., surface 1700 sq. m. R. R. forms a part of the Volga-Baltic waterway (q.v.).

